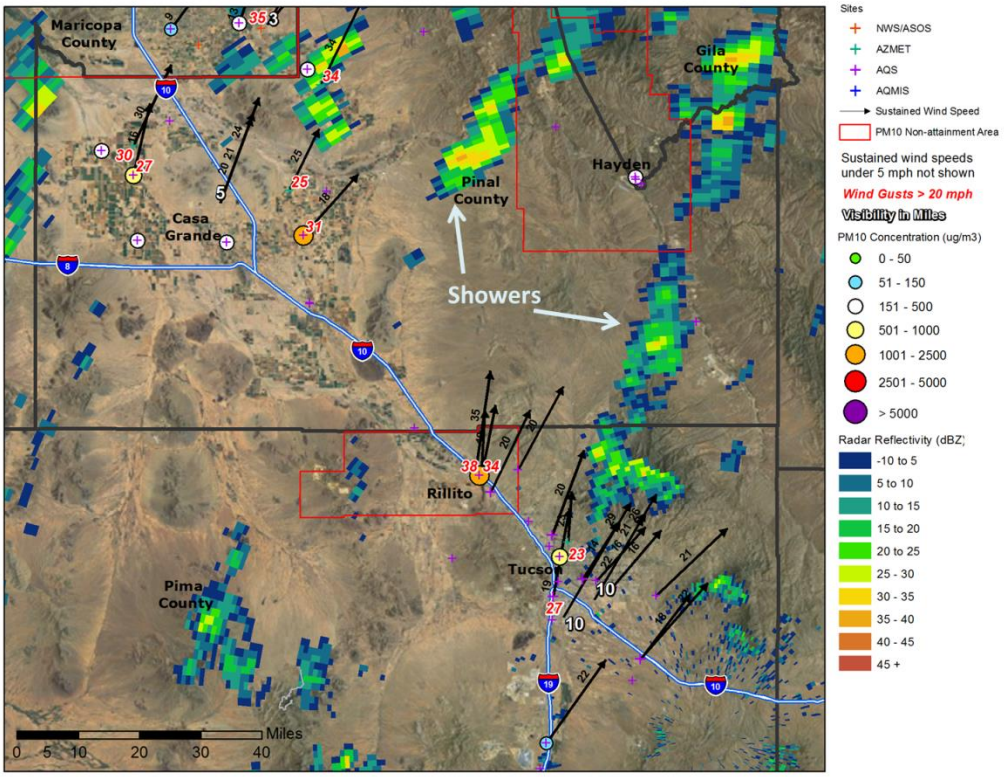
Sonoma Technology, Inc.
Air Quality Research and Innovative Solutions

State of Arizona Exceptional Event Documentation for the Event of November 4, 2011, for the Rillito PM_{10} Nonattainment Area



Final Report Prepared for

Arizona Department of Environmental Quality
Phoenix, AZ

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State of Arizona Exceptional Event Documentation for the Event of November 4, 2011, for the Rillito PM_{10} Nonattainment Area

Final Report
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Prepared by

Daniel Alrick
Angela Ekstrand
Hilary Hafner
Ashley Russell, PhD
Sonoma Technology, Inc.
1455 N. McDowell Blvd., Suite D
Petaluma, CA 94954-6503
Ph 707.665.9900 | F 707.665.9800
sonomatech.com

Prepared for

Theresa Rigney
Air Quality Assessment
Section Manager
1110 W. Washington Street
Phoenix, AZ 85007
602.771.2274

December 12, 2013

Cover graphic illustrates hourly wind speeds, visibilities, PM_{10} concentrations, and radar reflectivity in the Rillito, Arizona, area during the November 4, 2011, event. See Section 3 for more information.

Acknowledgments

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1. Introduction

On November 4, 2011, the Rillito monitor recorded a 24-hr average concentrations of PM_{10} of 226 µg/m^3 (particulate matter less than 10 microns in diameter). This value exceeds the National Ambient Air Quality Standard (NAAQS) of 150 µg/m^3 for 24-hr PM_{10}. This report demonstrates that this exceedance was caused by naturally occurring windblown dust, was not reasonably controllable or preventable, was historically unusual, and would not have occurred "but for" the windblown dust and, therefore, the event is an exceptional event as defined by the U.S. Environmental Protection Agency's (EPA) Exceptional Events Rule (EER).

1.1 Report Contents

Section 2 of this assessment contains a conceptual model of the windblown dust event that occurred on November 4, 2011, providing a background narrative of the exceptional event and an overall explanation of how the event affected air quality. Section 2 also provides evidence that the event was a natural event.

Section 3 of this assessment establishes a clear causal connection between the natural event on November 4, 2011, and the exceedance of the 24-hr PM_{10} standard at the monitoring station. The evidence in this section also confirms that the event in question both affected air quality and was the result of natural events.

Section 4 of this assessment contains data summaries and time-series graphs which help illustrate that the event of November 4, 2011, produced PM_{10} concentrations in excess of normal historical fluctuations.

Section 5 of this assessment details the existing dust control measures and demonstrates that despite the presence and enforcement of these controls, the event of November 4, 2011, was not reasonably controllable or preventable.

Section 6 of this assessment builds upon the demonstration, showing a clear causal connection between the natural event and the exceedance, and concludes that the exceedance of the 24-hr PM_{10} standard on November 4, 2011, would not have occurred but for the event.

Appendix A contains time-series graphs and data tables to supplement Section 3. **Appendix B** contains air quality forecasts issued by the Arizona Department of Environmental Quality (ADEQ) and weather statements and warnings issued by the National Weather Service (NWS). **Appendix C** contains a copy of the affidavit of public notice concerning this assessment report.

1.2 Exceptional Event Rule Requirements

In addition to the technical requirements contained in the EER, procedural requirements must also be met for the EPA to concur that the flagged air quality monitoring data is due to an exceptional event. This section of the report contains the requirements of the EER and associated guidance, and discusses how ADEQ has addressed those requirements.

1.2.1 Public Notification That the Event Was Occurring (40 CFR 50.14(c)(1)(i))

ADEQ issued Air Quality Forecasts indicating that strong southwesterly winds of up to 50 mph would generate widespread blowing dust across southern Arizona. More information on ADEQ's forecasting program can be found in Section 5.2 of this report. The forecasts and advisories that were issued for November 4, 2011, are included in Appendix B.

1.2.2 Place Informal Flag on Data in AQS (40 CFR 50.14(c)(2)(ii))

ADEQ and other operating air quality agencies in Arizona submit data into the EPA's Air Quality System (AQS), the official repository of ambient air quality data. This data submittal to AQS includes PM data from both filter-based and continuous monitors operated in Arizona.

When ADEQ and/or another agency operating monitors in Arizona suspects that data may be influenced by an exceptional event, ADEQ and/or the other operating agency expedites analysis of the filters collected from the potentially affected filter-based air monitoring instruments, quality-assures the results, and submits the data into AQS. ADEQ and/or other operating agencies also submit data from continuous monitors into AQS after quality assurance is complete.

If ADEQ and/or other operating air quality agencies determine that the potential exists for a monitor's reading(s) to be influenced by an exceptional event, a preliminary flag is submitted for the measurement in AQS. The data are not official until they undergo more thorough quality assurance and quality control, leading to certification by May 1 following the calendar year in which the data were collected (40 CFR 58.15(a)(2)). The presence of the flag can be confirmed in AQS.

1.2.3 Notify EPA of Intent to Flag Through Submission of Initial Event Description by July 1 of Calendar Year Following Event (40 CFR 50.14(c)(2)(iii))

ADEQ submitted a letter to EPA on September 11, 2013, listing all days for calendar years 2011–2013 that ADEQ intends to analyze under the EER. The PM_{10} exceedance that occurred at the Rillito monitor on November 4, 2011, in the Rillito PM_{10} Nonattainment Area (RNA) was included on this list. This assessment report demonstrates support for the flagging of these data.

1.2.4 Document That the Public Comment Process Was Followed for Event Documentation (40 CFR 50.14(c)(3)(iv))

ADEQ posted this assessment report on the ADEQ webpage and placed a hard copy of the report in the ADEQ Records Management Center for public review. ADEQ opened a 30-day public comment period on February 7, 2014. A copy of the public notice certification, along with any comments received, will be submitted to EPA, consistent with the requirements of 40 CFR 50.14(c)(3)(iv). See Appendix C for a copy of the affidavit of public notice.

1.2.5 Submit Demonstration Supporting Exceptional Event Flag (40 CFR 50.14(a)(1-2))

At the close of the public comment period, and after ADEQ has had the opportunity to consider any comments submitted on this document, ADEQ will submit this document, the comments received, and ADEQ's responses to those comments to EPA Region 9 headquarters in San Francisco, California. The deadline for the submittal of this package is December 31, 2014.

1.2.6 Documentation Requirements (40 CFR 50.14(c)(3)(iii))

The EER states that in order to justify the exclusion of air quality monitoring data, evidence must be provided for the following elements:

1. The event satisfies the criteria set forth in 40 CFR 50.1(j) that
    a. the event affected air quality,
    b. the event was not reasonably controllable or preventable, and
    c. the event was caused by human activity unlikely to recur in a particular location or was a natural event;
2. There is a clear causal relationship between the measurement(s) under consideration and the event;
3. The event is associated with a measured concentration(s) in excess of normal historical fluctuations; and
4. There would have been no exceedance or violation but for the event.

1.3 Guide to New Material in This Report

Naturally occurring dust events occur several times per year in Arizona, with each event requiring the preparation of exceptional events documentation. Some text in this documentation is required by the EER and is common to all the demonstrations. The text, figures, and tables unique to this event are outlined in **Table 1-1**.

Table 1-1. Summary of information unique to the Rillito November 4, 2011, event.

Section	Unique Material
Throughout the report	Event date(s) updated
Section 2.4	Event day summary
Chapter 3	Clear causal relationship
Chapter 4	Historical norm
Section 5.1.6 through Section 5.4	Source-permitted inspections and public complaints, forecasts and warnings, and wind observations
Chapters 6 and 7	But-for analysis and conclusion
Appendices A and B	Additional data and forecasts

2. Conceptual Model

This section provides a narrative background and summarizes the meteorological and air quality conditions in Rillito on November 4, 2011. This section includes

- A description and map of the geographic setting of the air quality and meteorological monitors.
- A description of Rillito's regional climate.
- An overall description of meteorological and air quality conditions on the event day.

2.1 Geographic Setting and Monitor Locations

Rillito is an unincorporated community in Pima County in southern Arizona, approximately 88 miles southeast of Phoenix and 20 miles northwest of Tucson (**Figure 2-1**). Rillito is bordered on all sides by the incorporated town of Marana. The region, along with much of southern Arizona, is in the Sonoran Desert. Rillito and Marana are flanked by the foothills of the Tortolita Mountains to the east, the Tucson Mountains to the south, and the Silver Bell Mountains to the west. Rillito and Marana lie at an elevation of approximately 1,900 feet above sea level, while peaks in each of the surrounding mountain ranges exceed 4,500 feet above sea level.

The RNA encompasses 324 square miles and nine townships. Much of the RNA comprises undeveloped land, and approximately 30% of the RNA consists of land cleared for agricultural purposes. Interstate 10 (I-10) traverses the northeastern corner of the RNA, and the Silver Bell copper mine is in the southwestern corner of the RNA. Saguaro National Park is south of the RNA.

Over the past 20 years, the RNA has undergone a transformation from a predominantly rural, agricultural area to an area of substantial population growth. The town of Marana has annexed large sections of the RNA and has grown from an estimated population of just over 2,000 in 1990 to over 30,000 in 2010. The population of Rillito has also grown during this period, but because of its very small geographic area, Rillito's population was only 97 as of 2010.

The air quality and meteorological monitors used in this analysis are shown in **Figure 2-1**. AQS monitors measure air quality and meteorological data; Arizona Meteorological Network (AZMET) and NWS monitors measure meteorological data only. The PM_{10} exceedance on November 4, 2011, was recorded at the Rillito monitor, which has been operational since 1985 (**Figure 2-2**). In 2005, the monitor was moved to a new location less than 1,000 feet from its original location. The site is close to residential and industrial areas (chiefly, the California Portland Cement plant). Collocated wind data are available from the Rillito monitor. One AZMET monitor was in operation near the Rillito monitor during the November 4, 2011, dust event. There are no official NWS monitors in the immediate vicinity of Rillito. However, data from two NWS monitors in Tucson (about 15 to 20 miles away) and Casa Grande (about 50 miles away) are used in this report to illustrate regional weather conditions.

Recent analyses have determined that the I-10 corridor between Marana/Rillito and Casa Grande is particularly susceptible to dust storms and fatal traffic accidents due to the associated low visibilities.[1] These analyses identify this region as particularly susceptible to dust storms because much of the land was originally used for agricultural purposes. That land has since been largely abandoned and allowed to revert to open desert. Desert soil that has been farmed and then abandoned in this manner takes a long time to recover. As a result, there is a dearth of vegetation to hold down or catch blowing dust. Most of this land is located from Rillito northward into Pinal County.

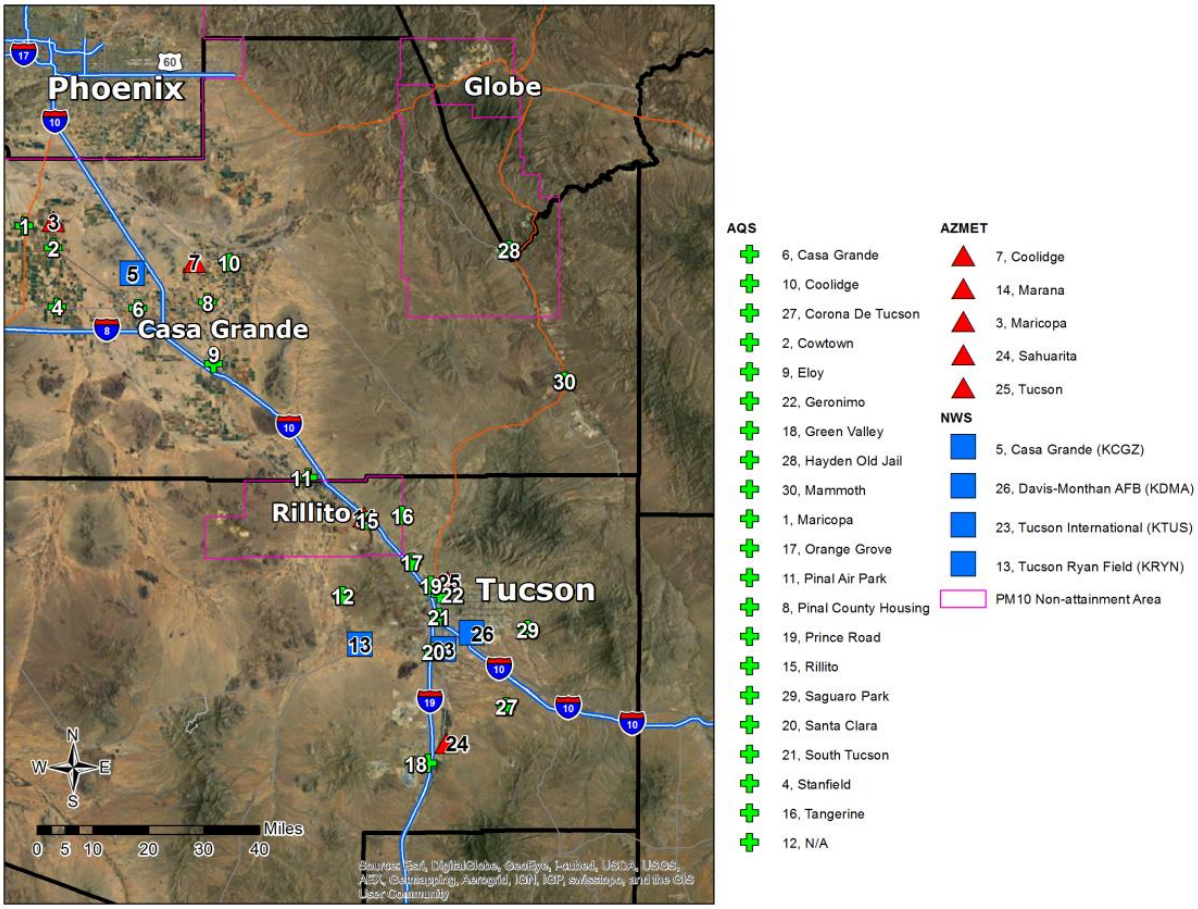

Figure 2-1. Air quality and meteorological monitors in Pima and Pinal counties.

[1] Several media outlets reported on the I-10 corridor dust storm analyses, including http://bit.ly/1gClpJq.

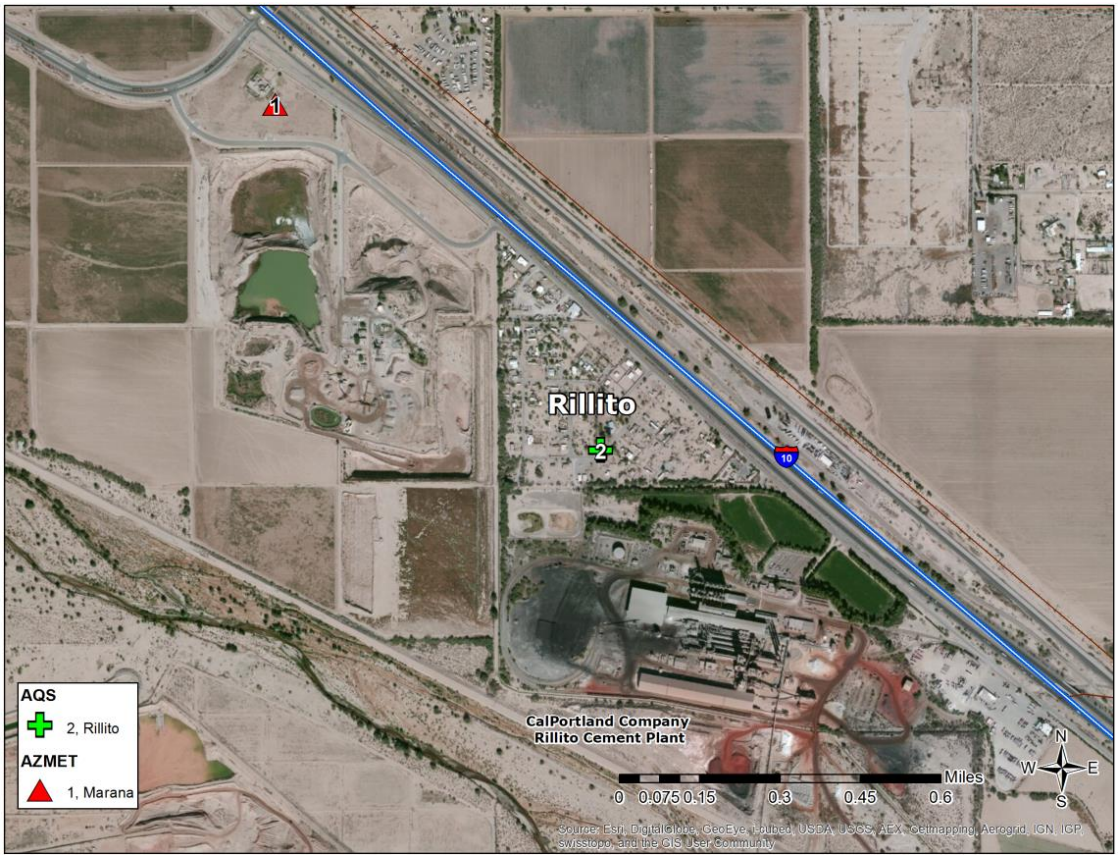

Figure 2-2. Air quality and meteorological monitors in the immediate Rillito region.

2.2 History of PM_{10} Attainment Status for Rillito

ADEQ began monitoring PM in what is now the RNA in 1971. The original measurement standard for PM, known as total suspended particulate matter (TSP), included a size range of particles collected by high-volume samplers (generally particles up to 40 microns in diameter). PM_{10} monitoring began in the RNA in 1985 on a sampling schedule of once every six days. Daily PM_{10} monitoring in the RNA began on April 1, 2010. On July 1, 1987, EPA revised PM standards to include only PM_{10} (52 FR 24634). As part of the implementation policy for the new standards, where insufficient observational PM_{10} data were available, EPA categorized areas of the country according to their probability of violating the standards: (1) Group I areas have a high probability of violating the standards, (2) Group II areas have a moderate probability of violating the standards, and (3) Group III areas are unlikely to violate the standards.

EPA listed Rillito as a Group I area. As a result, the state of Arizona was required to submit a State Implementation Plan (SIP) within nine months of the promulgation of the NAAQS (52 FR 24672, July 1, 1987, and 52 FR 29383, August 7, 1987).

Prior to the state of Arizona's submission of a SIP, EPA updated its initial geographic descriptions for the Group I and Group II areas. Consistent with EPA's PM_{10} grouping scheme, the Rillito Group I Area was designated and classified as a moderate PM_{10} nonattainment area

upon enactment of the 1990 Clean Air Act (CAA) amendments, effective November 15, 1990. This action included requirements for submittal of an attainment demonstration and reasonably available control measures (RACM) implementation provisions by November 15, 1991.

ADEQ submitted a PM_{10} moderate nonattainment area attainment demonstration for the RNA on November 14, 1991. In a letter dated May 14, 1992, EPA found this plan to be incomplete because it lacked an emissions inventory. On April 22, 1994, ADEQ submitted a revised PM_{10} attainment plan for Rillito. In a letter dated August 18, 1994, EPA found the revised plan to be incomplete because of a lack of RACM. EPA has not taken further action on the 1994 PM_{10} plan.

No exceedances of the 24-hr PM_{10} NAAQS occurred in the RNA from 1990 through 2006. As a result, EPA determined that the RNA had met the PM_{10} NAAQS and issued a "clean data" finding for the area in 2006. Subsequently, ADEQ submitted to EPA a PM_{10} Limited Maintenance Plan (LMP) and a request for redesignation of the area to attainment. The LMP is a streamlined alternative to the reporting required under a regular Maintenance Plan.

2.3 Climate

Rillito's climate is typical of the desert region of the southwestern United States. The warmest months of the year are June through August, when average daily maximum temperatures are near 100°F (**Figure 2-3**). Average annual rainfall in Rillito is nearly 12 inches. The bulk of this rain usually falls during July through September, with a secondary maximum during December through February. During December through February, winter storms originating from the Pacific Ocean can produce significant rains in southern Arizona. During July through September, monsoonal moisture originating from the Gulf of California and Gulf of Mexico, as well as large thunderstorm complexes over the Sierra Madre Occidental Mountains in Mexico, move northward into Arizona. Prevailing winds in the Tucson/Rillito area are from the southeast.

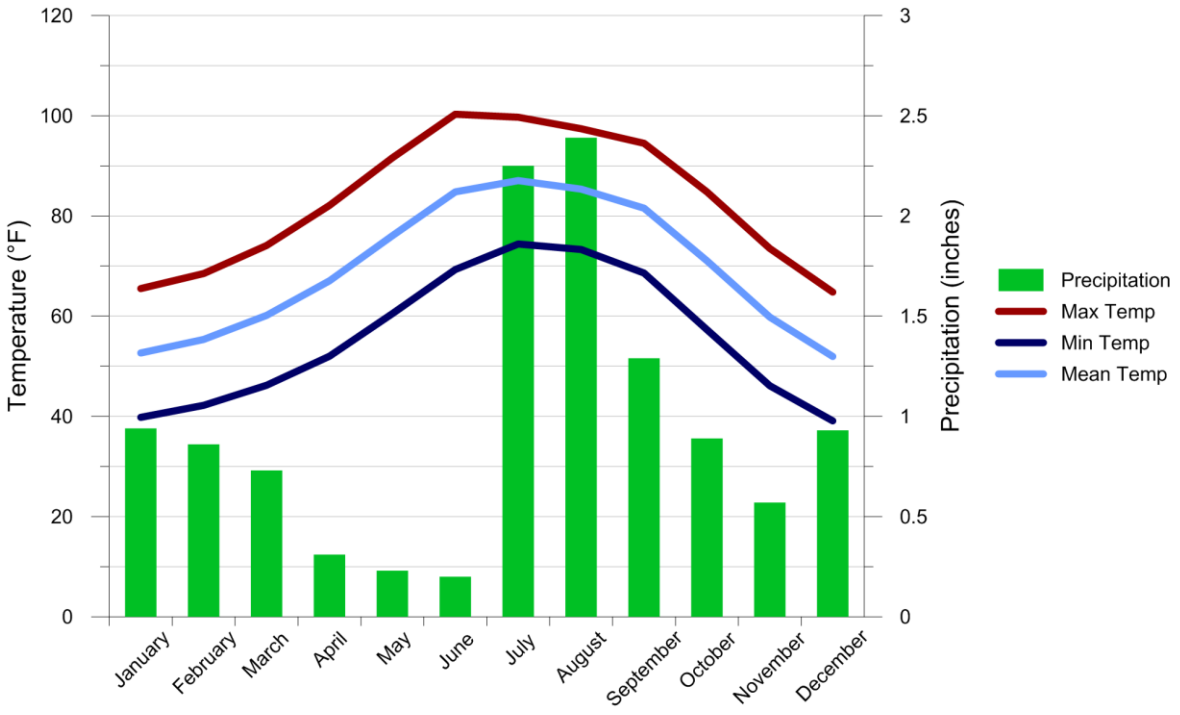

Figure 2-3. Average monthly temperatures and precipitation for Tucson, 1981–2010. Rillito does not have an official NWS climate site. The nearest NWS climate site is in Tucson, approximately 15 miles southeast of Rillito.

While windblown dust events in Arizona during the summer monsoon season are often due to outflow winds from thunderstorms, windblown dust events in the fall, winter, and spring are usually due to strong winds associated with low-pressure systems and cold fronts moving southeast across California and Arizona. These winds are the result of strong surface pressure gradients between the approaching low-pressure system (or cold front) and higher pressure ahead of it. As the low-pressure system (or cold front) approaches and passes, gusty southwesterly winds typically shift to northwesterly. Gusty easterly winds can also develop in the Tucson/Rillito area when strong surface high pressure builds southward along the Rocky Mountains, resulting in a strong pressure gradient over Arizona. The strong winds can loft dust into the air and transport it over long distances, especially if soils in the region are dry.

2.4 Event Day Summary

On November 4, 2011, strong southwesterly winds generated by an approaching Pacific storm system transported dust northeastward into Rillito (**Figure 2-4**). The windblown dust resulted in a 24-hr average PM_{10} concentration of 226 µg/m^3 at the Rillito monitor (**Table 2-1**); this value is in exceedance of the NAAQS. The hourly and 24-hr average PM_{10} concentrations measured at the Rillito monitor were in excess of normal historical fluctuations. The dust was naturally occurring and likely originated over undeveloped lands southwest of Rillito outside the Rillito PM_{10} Nonattainment Area. Wind gusts of up to 38 mph were measured at the Rillito monitor; these winds overwhelmed reasonable dust control measures. Numerous other PM_{10} monitors in southern Arizona also recorded exceedances of the NAAQS on this date, illustrating

the regional nature of this event. In January 2013, ADEQ submitted to EPA exceptional event documentation regarding this event for sixteen exceedance monitors in Maricopa County. In May 2013, EPA concurred with ADEQ's analysis demonstrating that those exceedances were due to windblown dust.

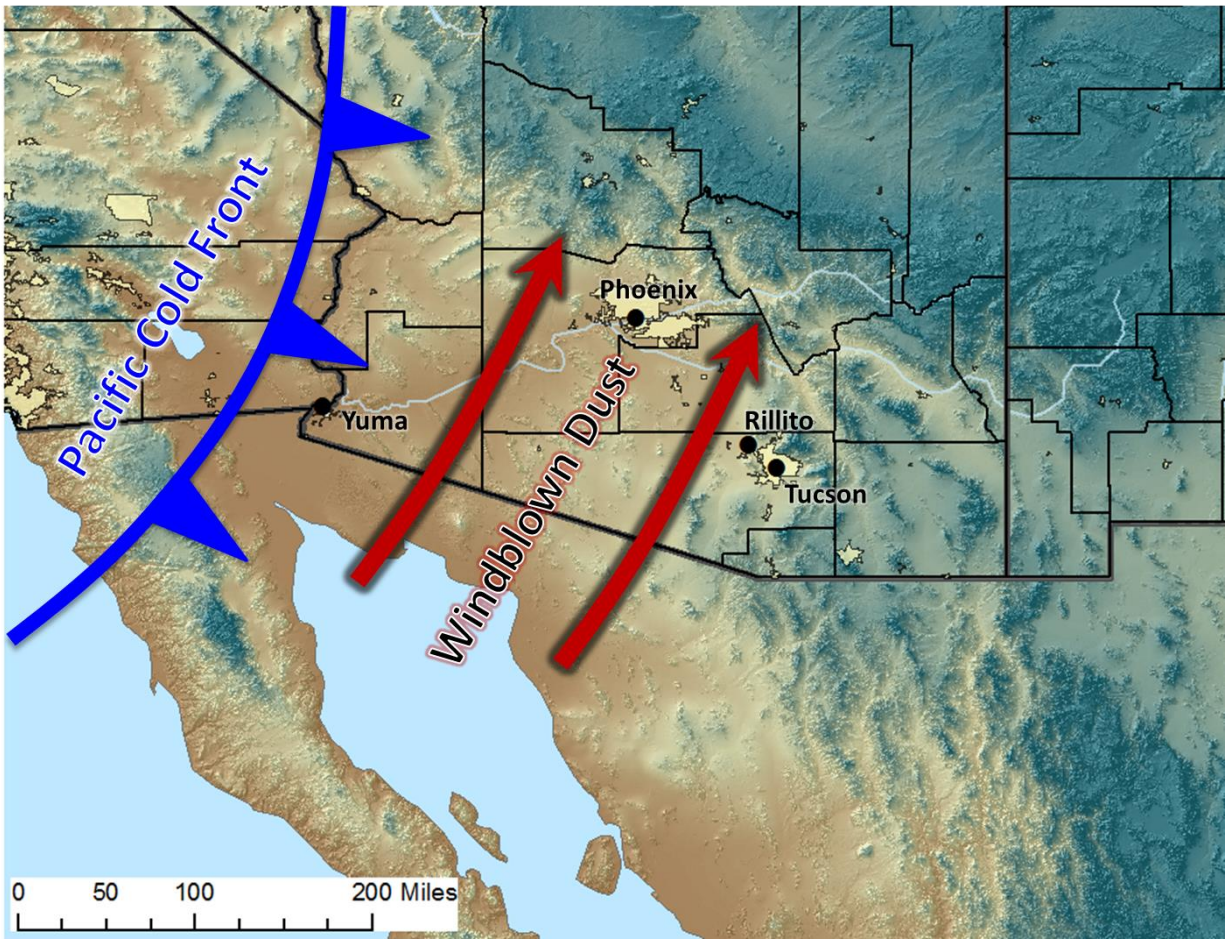

Figure 2-4. Strong southwesterly winds ahead of an approaching Pacific storm system transported dust into the Rillito area on November 4, 2011.

Table 2-1. PM_{10} measurements collected in Arizona on November 4, 2011. Data from the Rillito monitor are shown in **bold green**. The exceedances at monitors in Maricopa County were previously concurred on by EPA as having been caused by windblown dust.

Monitor	Monitor Type	Operator	AQS Monitor ID	24-hr Avg PM_{10} ($\mu g/m^3$)	1-hr Max PM_{10} ($\mu g/m^3$)	Time of Max 1-hr PM_{10} (MST)	AQS Qualifier Flag
Apache County							
N/A	TEOM	WMAT	04-001-1003-81102-1	29	57	2200	
Coconino County							
N/A	TEOM	NNIR	04-005-1237-81102-1	36	77	0900	
Gila County							
Hayden Old Jail	TEOM	ADEQ	04-007-1001-81102-3	119	508	2300	IJ
Maricopa County							
West Phoenix	TEOM	MCAQD	04-013-0019-81102-1	280	1506	1700	RJ
North Phoenix	GRAV	MCAQD	04-013-1004-81102-1	186	N/A	N/A	RJ
North Phoenix	BAM	MCAQD	04-013-1004-81102-2	186	1053	1800	RJ
Glendale	TEOM	MCAQD	04-013-2001-81102-1	229	1083	1700	RJ
Central Phoenix	TEOM	MCAQD	04-013-3002-81102-4	223	1289	1800	RJ
Greenwood	TEOM	MCAQD	04-013-3010-81102-1	231	1507	1800	RJ
South Phoenix	TEOM	MCAQD	04-013-4003-81102-1	231	904	1800	RJ
West Chandler	TEOM	MCAQD	04-013-4004-81102-1	670	2745	1500	RJ
Higley	TEOM	MCAQD	04-013-4006-81102-1	258	1243	1500	RJ
West 43rd Ave	TEOM	MCAQD	04-013-4009-81102-1	243	1230	1700	RJ
Dysart	TEOM	MCAQD	04-013-4010-81102-1	224	1371	1800	RJ
Buckeye	TEOM	MCAQD	04-013-4011-81102-1	285	1638	1700	RJ
Zuni Hills	TEOM	MCAQD	04-013-4016-81102-1	259	1575	1800	RJ
Fort McDowell/Yuma Frank	TEOM	FMIR	04-013-5100-81102-3	237	N/A	N/A	
Durango Complex	TEOM	MCAQD	04-013-9812-81102-1	252	1146	1700	RJ
JLG Supersite	BAM	ADEQ	04-013-9997-81102-3	201	985	1700 1800	RJ
JLG Supersite	TEOM	ADEQ	04-013-9997-81102-4	200	1347	2100	RJ
Navajo County							
N/A	TEOM	WMAT	04-017-1002-81102-1	36	63	2100	
Pima County							
Ajo	TEOM	ADEQ	04-019-0001-81102-3	150	444	1400	IJ
Orange Grove	GRAV	PCDEQ	04-019-0011-81102-2	100	N/A	N/A	
Rillito	**TEOM**	**ADEQ**	**04-019-0020-81102-3**	**226**	**1241**	**2200**	**RJ**
South Tucson	GRAV	PCDEQ	04-019-1001-81102-1	119	N/A	N/A	
Green Valley	TEOM	PCDEQ	04-019-1030-81102-1	62	230	2100	
Geronimo	TEOM	PCDEQ	04-019-1113-81102-1	116	517	2200	

Table 2-1. PM_{10} measurements collected in Arizona on November 4, 2011. Data from the Rillito monitor are shown in **bold green**. The exceedances at monitors in Maricopa County were previously concurred on by EPA as having been caused by windblown dust.

Monitor	Monitor Type	Operator	AQS Monitor ID	24-hr Avg PM_{10} ($\mu g/m^3$)	1-hr Max PM_{10} ($\mu g/m^3$)	Time of Max 1-hr PM_{10} (MST)	AQS Qualifier Flag
Pinal County							
Casa Grande Downtown	TEOM	PCAQCD	04-021-0001-81102-3	428	N/A	N/A	RJ
Apache Junction Fire Station	TEOM	PCAQCD	04-021-3002-81102-3	225	N/A	N/A	RJ
Stanfield	TEOM	PCAQCD	04-021-3008-81102-3	586	N/A	N/A	RJ
Combs	TEOM	PCAQCD	04-021-3009-81102-3	280	N/A	N/A	RJ
Maricopa	TEOM	PCAQCD	04-021-3010-81102-3	336	N/A	N/A	RJ
Pinal County Housing (aka Eleven Mile Corner)	TEOM	PCAQCD	04-021-3011-81102-3	1161	N/A	N/A	RJ
Cowtown	TEOM	PCAQCD	04-021-3013-81102-3	395	N/A	N/A	RJ
Santa Cruz County							
Nogales Post Office	BAM	ADEQ	04-023-0004-81102-3	151	316	1600	IJ
Yuma County							
Yuma Supersite	TEOM	ADEQ	04-027-8011-81102-3	52	170	1700	

BAM: Beta Attenuation Monitor
CCDAQEM: Clark County Department of Air Quality and Environmental Management
FMIR: Fort McDowell Indian Reservation
FRM: Federal Reference Method
GRAV: Gravimetric Analysis
GRIC: Gila River Indian Community
HIR: Hualapai Indian Reservation
ICAPCD: Imperial County Air Pollution Control District
IJ: Qualifier flag for high winds
MCAQD: Maricopa County Air Quality Department
MDAQMD: Mojave Desert Air Quality Management District
MST: Mountain Standard Time
NNIR: Navajo Nation
NPS: National Park Service
PCAQCD: Pinal County Air Quality Control District
PCDEQ: Pima County Department of Environmental Quality
RJ: Qualifier flag for high winds
SCAQMD: South Coast Air Quality Management District
SRPMIC: Salt River Pima-Maricopa Indian Community
TEOM: Tapered Element Oscillating Microbalance
TMIR: Torres-Martinez Indian Reservation
V: Qualifier flag for a validated value
WMAT: White Mountain Apache Tribe

3. Causal Relationship

3.1 Discussion

Meteorological and air quality observations indicate that dust carried by strong south-southwesterly winds generated by an approaching low-pressure system and cold front was directly responsible for the high PM_{10} concentrations observed in Rillito on November 4, 2011 (**Figure 3-1**). PM_{10} concentrations peaked in the Rillito area between 20:00 and 23:00 MST on November 4, coincident with strong winds at collocated and nearby meteorological monitors (**Figures 3-2 and 3-3** and Appendix B). Gusty winds were reported for several hours before and after the peak in PM_{10} concentrations at Rillito. However, winds before the peak in PM_{10} concentrations were not nearly as strong as those measured during the peak in PM_{10} concentrations, and were not sufficient to loft large amounts of dust into the lower atmosphere. Early on November 5, after the peak in PM_{10} concentrations, winds remained gusty in the Rillito area, but rain associated with the cold front likely removed particles from the atmosphere and wet the ground sufficiently to reduce lofting of additional dust. The likely source region for PM_{10} during the November 4, 2011, event was the vast desert southwest of Rillito; this region consists largely of natural, undisturbed desert. As noted in Section 2.1, soils along the I-10 corridor between Marana/Rillito and Casa Grande are particularly prone to lofting and transport by strong winds. In addition, the last time the Rillito area recorded any measurable rainfall leading before the high-wind event on November 4, 2011, was on October 6, 2011, when light showers associated with a weak storm system produced 0.02 inches of rain in Tucson.

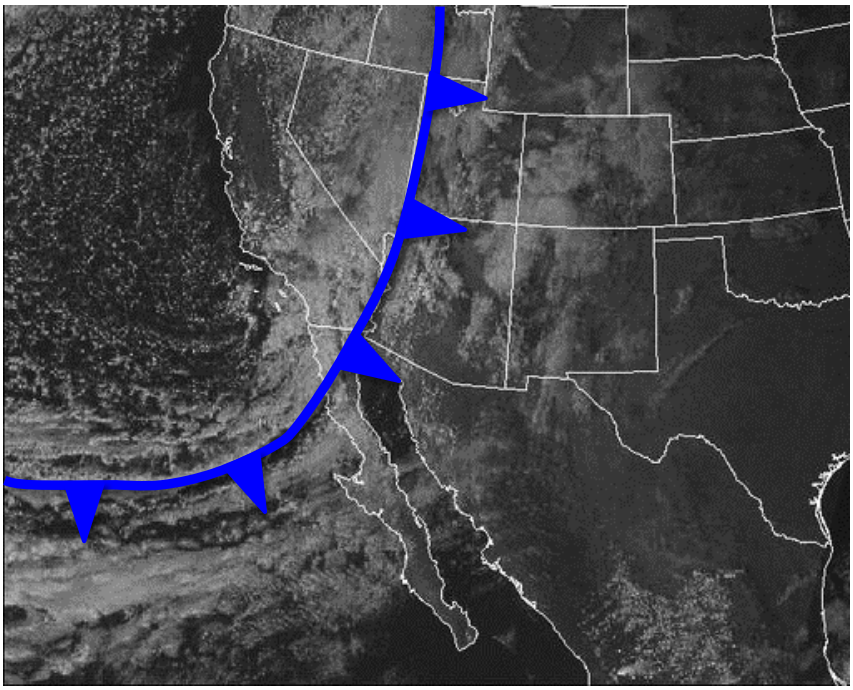

Figure 3-1. Visible satellite image from 16:00 MST on November 4, 2011 (GOES-West), depicting a strong cold front approaching Arizona. Strong south to southwesterly winds ahead of this front transported dust into the Rillito area.

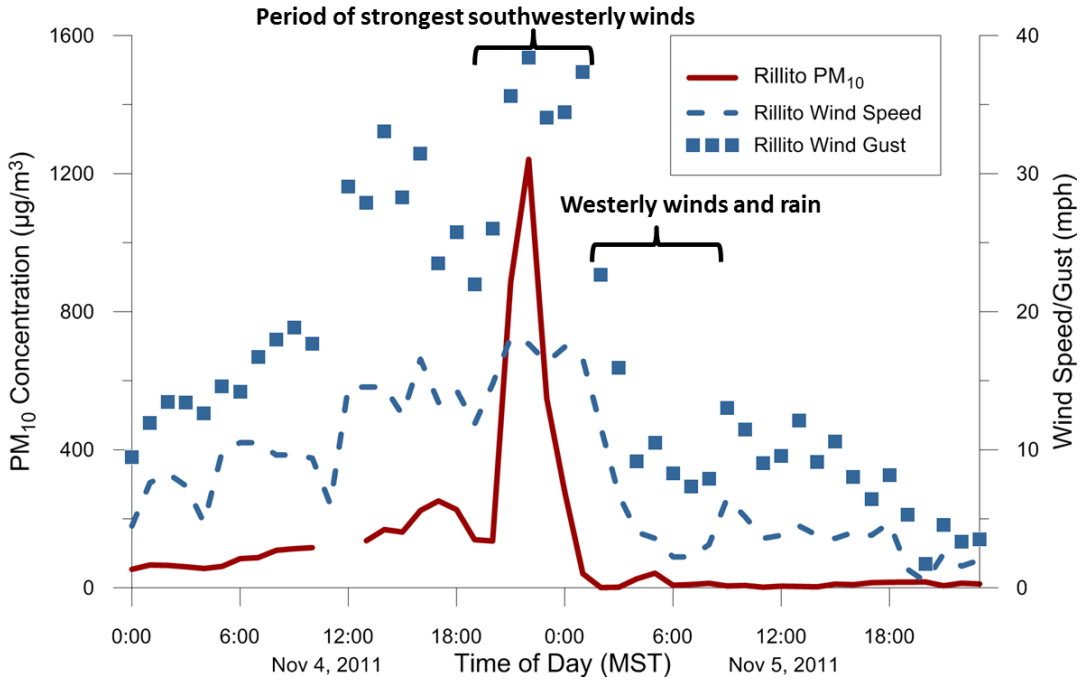

Figure 3-2. Hourly PM_{10} concentrations and wind speeds at the Rillito monitor on November 4 and 5, 2011. Strong winds and high PM_{10} concentrations were observed late on November 4, indicating the presence of windblown dust.

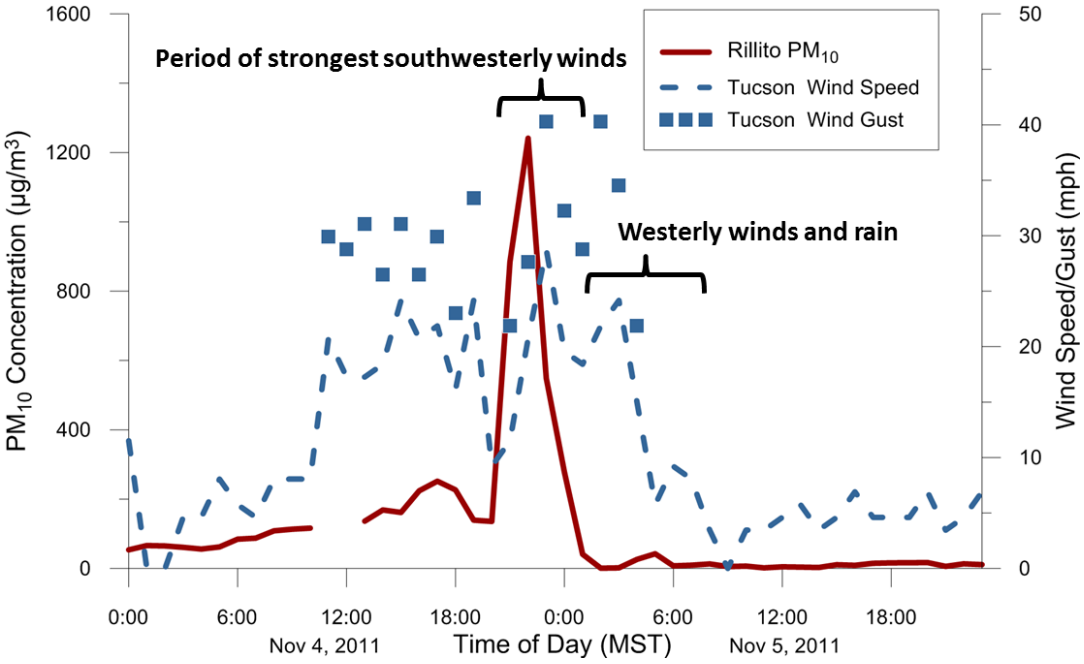

Figure 3-3. Hourly PM_{10} concentrations at the Rillito monitor and wind speeds at Tucson International Airport on November 4 and 5, 2011. Strong winds and high PM_{10} concentrations were observed late on November 4, indicating the presence of windblown dust.

Figures 3-4 through 3-8 illustrate wind, visibility, and PM_{10} concentration data across Pima and Pinal counties before, during, and after the peak wind speeds and PM_{10} concentrations. At 09:00 MST on November 4, wind speeds throughout the region were generally light from the southeast, PM_{10} concentrations were low, and visibilities were high (Figure 3-4). As the low-pressure system and cold front moved into Arizona, winds increased from the south across the Rillito and Tucson areas (Figure 3-5). PM_{10} concentrations at the Rillito monitor increased in response to stronger winds, but were still below 200 $\mu g/m^3$. Stronger south-southwesterly winds and much higher PM_{10} concentrations were reported in Pinal County, which was closer to the approaching low-pressure system responsible for the strong winds.

At 22:00 MST, winds and PM_{10} concentrations peaked in the Rillito area, with a reported wind gust of 38 mph and a 1-hour PM_{10} concentration of 1,241 $\mu g/m^3$ (Figure 3-6). Other monitors in Pima and Pinal counties also reported strong south-southwesterly winds and high PM_{10} concentrations. The NWS office in Tucson initially issued a Wind Advisory for the region due to the potential for sustained winds of 25 to 35 mph, wind gusts of up to 50 mph, and reduced visibilities. The Wind Advisory was later upgraded to a High Wind Warning, with the potential for wind gusts of up to 60 mph in open areas. Weather statements and additional wind gust observations are shown in Appendix B. While south-southwesterly winds are favorable for transport of emissions from the nearby California Portland Cement factory to the Rillito monitor, the fact that strong winds, high PM_{10} concentrations, and low visibilities were observed regionwide indicates that the exceedance of the NAAQS recorded at the Rillito monitor was not directly attributable to local sources. South-southwesterly or southwesterly winds are also not favorable for transport of emissions from the Silver Bell Mine (located about 20 miles west of Rillito). A summary of area peak sustained winds and wind gusts measured at area monitors on November 4 is shown in **Table 3-1**.

After midnight on November 5, winds remained gusty regionwide, but PM_{10} concentrations decreased rapidly (Figure 3-7). The decrease in PM_{10} concentrations is due primarily to widespread rain showers associated with the cold front. Rain acts to strip PM_{10} from the atmosphere and deposit it on the surface, and wets the surface soils to prevent additional lofting of dust. Following passage of the cold front, winds decreased considerably regionwide (Figure 3-8).

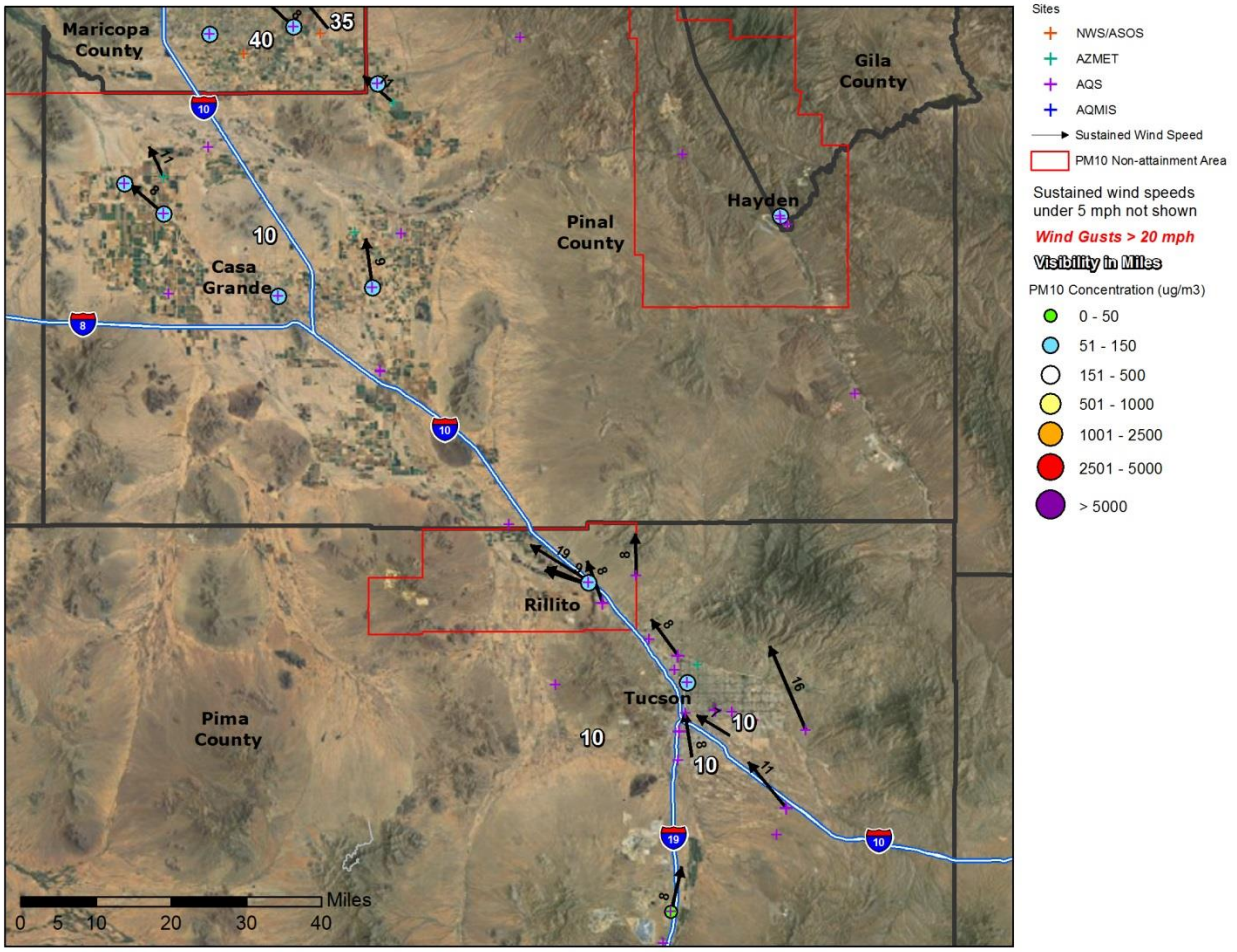

Figure 3-4. Observations at Pima and Pinal county monitors between 09:00 MST and 10:00 MST on November 4, 2011, of hourly PM_{10} concentrations (colored circles), wind speed and direction (arrows), and minimum visibility (white numbers). Winds were generally light, PM_{10} concentrations were low, and visibilities were high throughout the region at this time.

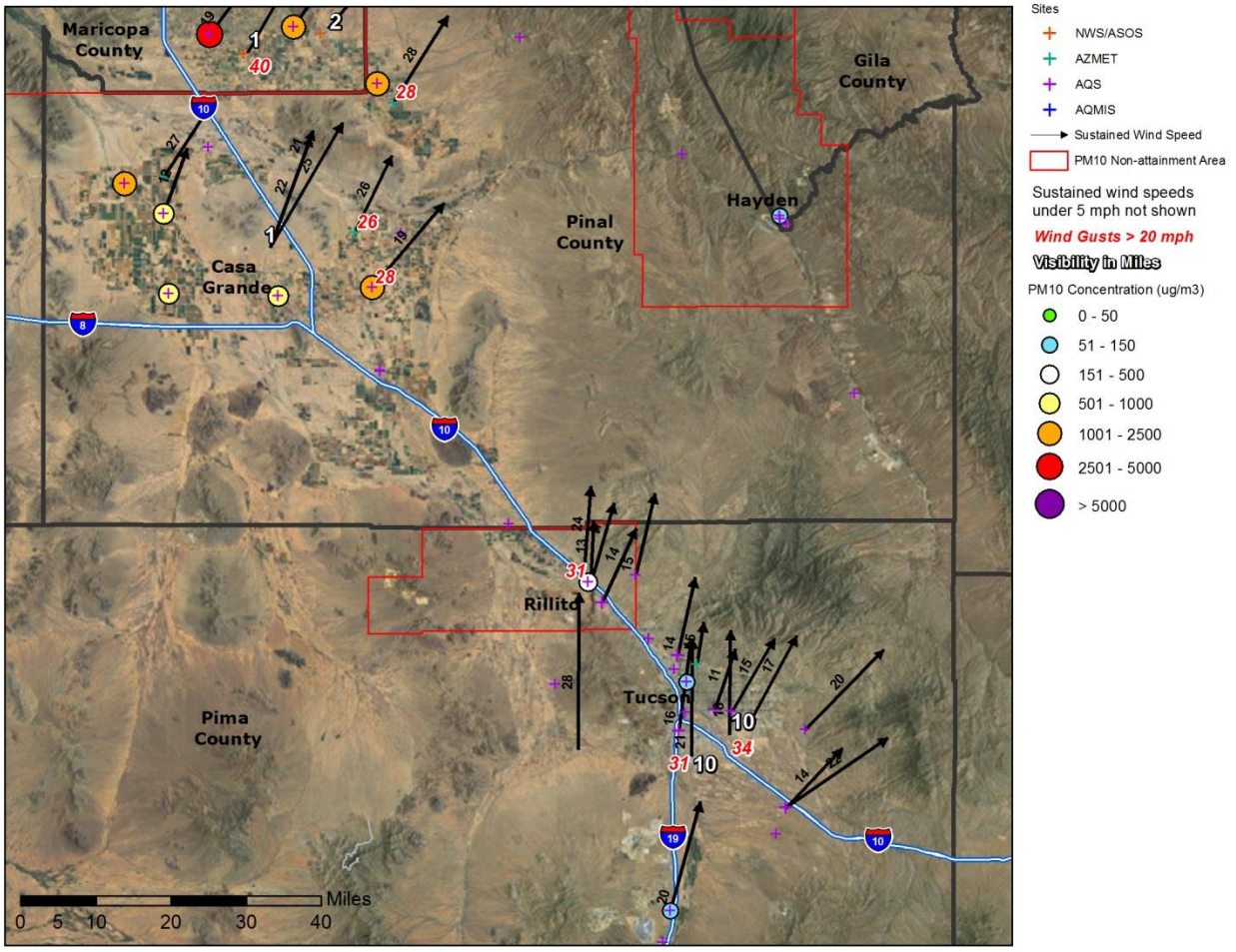

Figure 3-5. Observations at Pima and Pinal county monitors between 15:00 MST and 16:00 MST on November 4, 2011, of hourly PM_{10} concentrations (colored circles), wind speed and direction (arrows), and minimum visibility (white numbers). Strong south-southwesterly winds, high PM_{10} concentrations, and reduced visibilities were reported in Pinal County. Winds speeds also increased over Pima County, but were not yet strong enough to loft large amounts of dust.

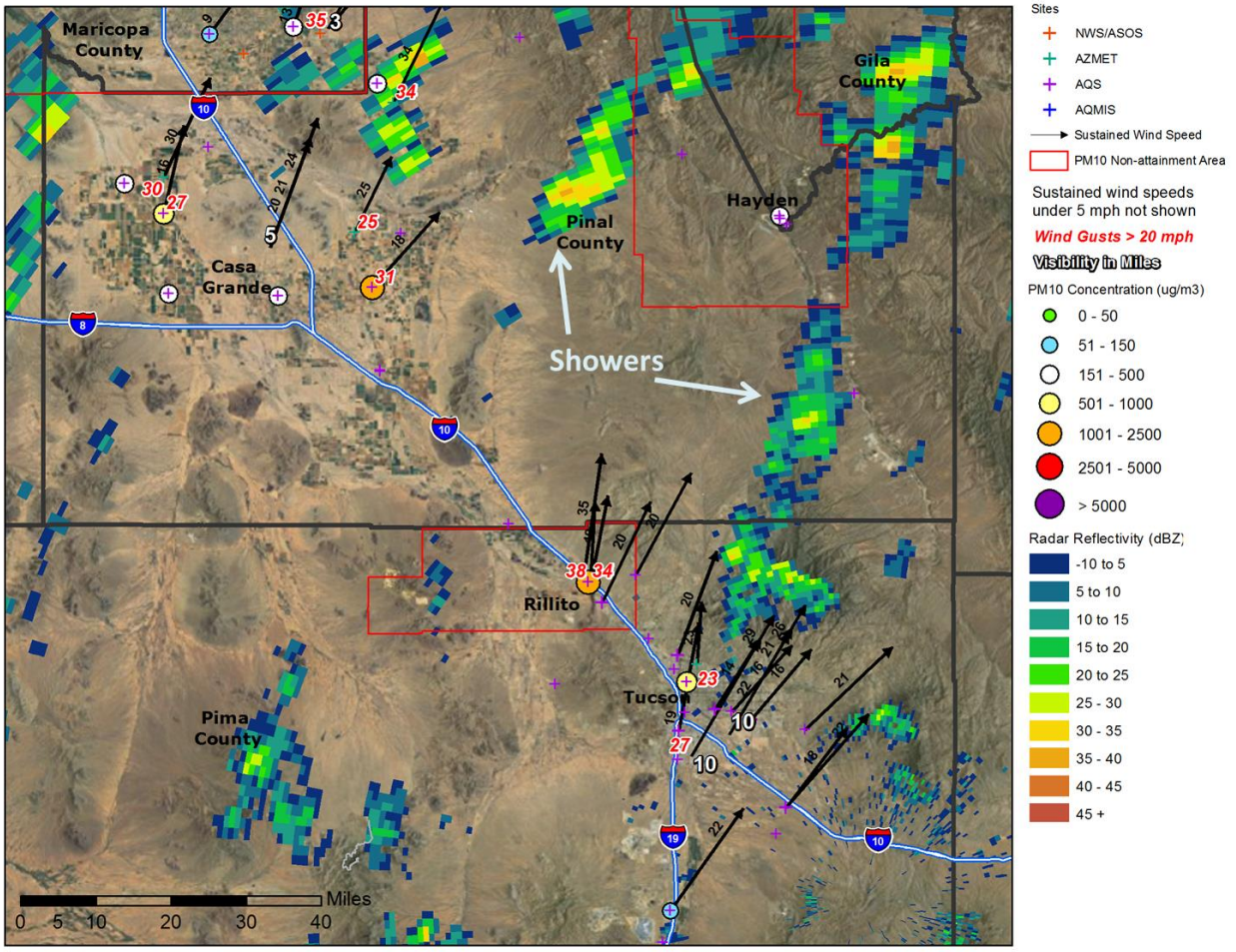

Figure 3-6. Radar reflectivity and observations of hourly PM_{10} concentrations (colored circles), wind speed and direction (arrows), and minimum visibility (white numbers) at Pima and Pinal county monitors between 22:00 MST and 23:00 MST on November 4, 2011. Gusty south-southwesterly winds and high PM_{10} concentrations were reported regionwide. Doppler radar also indicated showers (greens and yellows) beginning to develop across southern Arizona, but not yet affecting areas near the Rillito monitor.

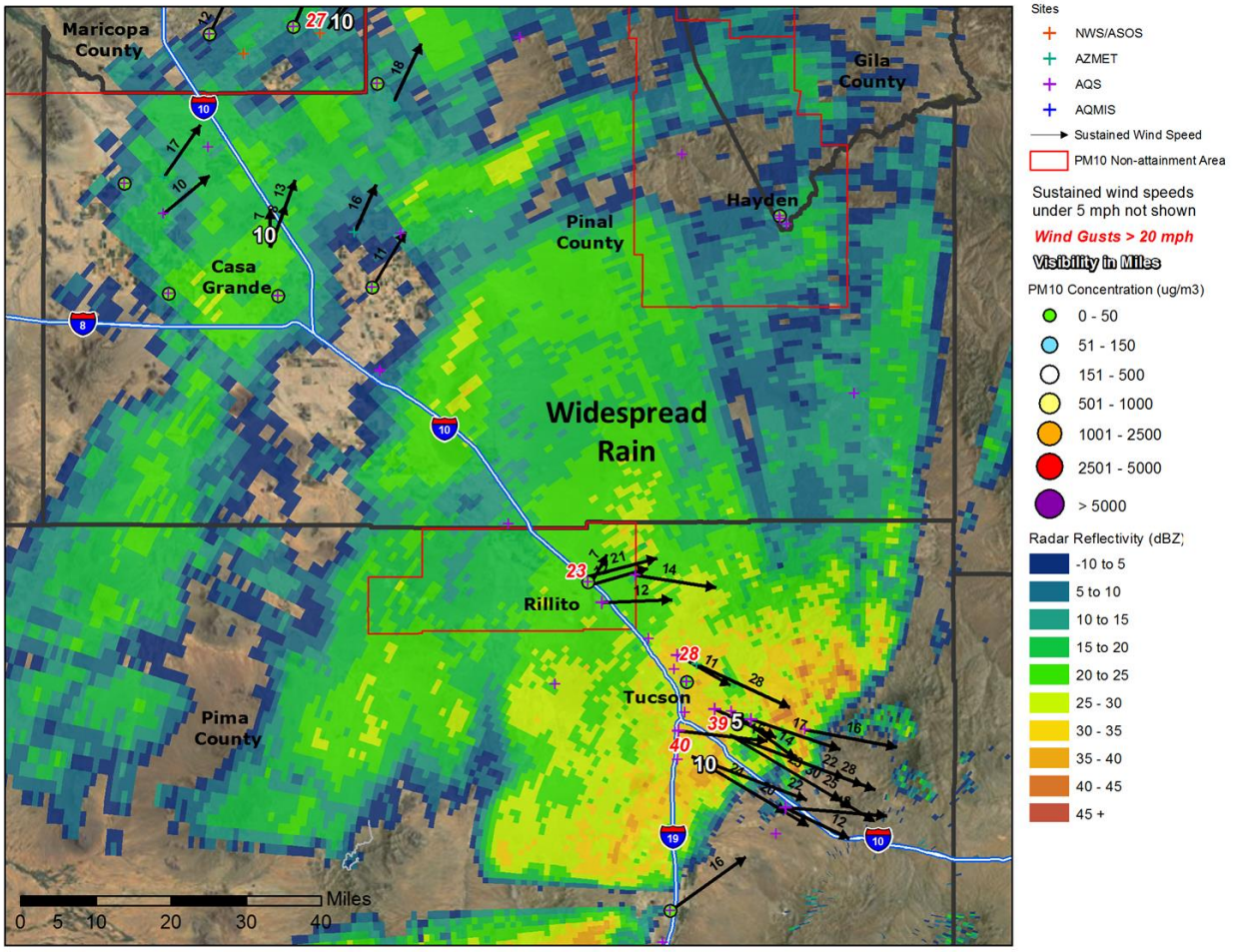

Figure 3-7. Radar reflectivity and observations of hourly PM_{10} concentrations (colored circles), wind speed and direction (arrows), and minimum visibility (white numbers) at Pima and Pinal county monitors between 02:00 MST and 03:00 MST on November 5, 2011. As the cold front moved through southern Arizona, winds remained gusty but shifted to westerly or west-northwesterly in Pima County. Widespread rain (greens, yellows, oranges) stripped dust from the atmosphere and reduced lofting of dust from surface soils, resulting in much lower PM_{10} concentrations.

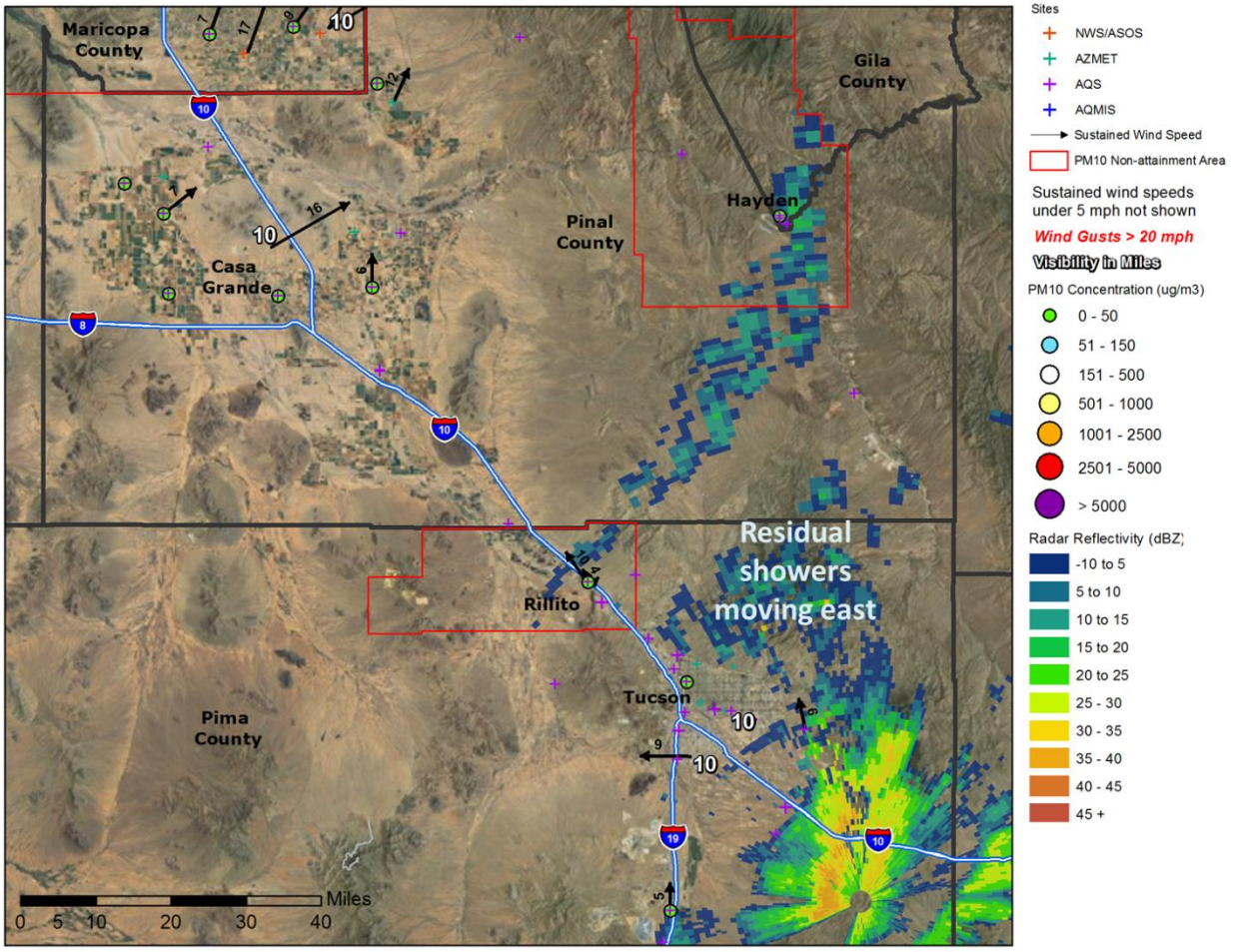

Figure 3-8. Radar reflectivity and observations of hourly PM_{10} concentrations (colored circles), wind speed and direction (arrows), and minimum visibility (white numbers) at Pima and Pinal county monitors between 05:00 MST and 06:00 MST on November 5, 2011. As the cold front departed to the east, winds diminished regionwide, resulting in lower PM_{10} concentrations. Showers associated with the cold front were also moving east out of the area.

Table 3-1. Peak observed wind speeds and wind gusts at Pima and Pinal county monitors on November 4, 2011. The Rillito monitor reported a 1-hr PM_{10} concentration of 1,241 µg/m^3 at 22:00 MST, coincident with the peak wind speed and peak wind gust reported at that monitor.

Monitor	Maximum Wind Speed (mph)	Wind Direction (degrees)	Time (MST)	Maximum Wind Gust (mph)	Time (MST)
Casa Grande	30	200	14:35	41	23:35
Tucson Ryan Field	29	180	17:55	36	17:55
Rillito	18	208	21:00	38	21:00
Marana	22	188	22:00	35	22:00
Tucson International Airport	29	210	22:53	40	22:53
Tucson Davis Monthan Air Force Base (AFB)	26	210	22:58	41	22:58

3.2 Summary

The information presented in this section demonstrates a clear causal relationship between the windblown dust and the PM_{10} exceedance measured at the Rillito monitor on November 4, 2011. The PM_{10} and wind data shown in this section illustrate the spatial and temporal representation of the windblown dust as it impacted Rillito. Strong south-southwesterly winds likely lofted large amounts of dust and PM_{10} into the lower atmosphere. This dust likely originated in open desert areas southwest of Rillito and was transported into Rillito by the strong winds. Strong winds and high PM_{10} concentrations were observed throughout southern Arizona, resulting in PM_{10} exceedances at several other monitors in Pinal and Maricopa counties. The time-series plots of air quality and meteorological data found in this section and in Appendix A show that the sharp increase in PM_{10} concentrations coincided with the period of strongest winds in Rillito. In addition, statements and advisories from the NWS office in Tucson reflect the hazardous weather conditions observed throughout the region.

4. Historical Norm

4.1 Analysis

PM_{10} concentrations measured at the Rillito monitor on November 4, 2011, were unusual and in excess of normal historical fluctuations. Time-series plots of the 24-hr average PM_{10} concentrations for January 1, 2007, through December 31, 2011, provide a historical perspective of PM_{10} concentrations at Rillito (**Figure 4-1**). The PM_{10} concentrations measured on November 4, 2011, were some of the highest hourly and 24-hr averages measured over the last five years, with hourly concentrations exceeding 1,000 µg/m^3. Please note that prior to April 1, 2010, the Rillito monitor operated on a one-in-six day schedule.

Historical daily cumulative distributions of the 24-hr average PM_{10} concentrations were created for the Rillito monitor for the same five-year data set to provide additional evidence in establishing the severity of this event. **Figure 4-2** shows a histogram of 24-hr average PM_{10} concentrations at the Rillito monitor and the corresponding 95th percentile. The 24-hr average PM_{10} concentration on November 4, 2011, was more than two times higher than the 95th percentile at the Rillito monitor. Concentrations in excess of the 95th percentile are considered to be unusual.[2]

4.2 Summary

Given the recorded values and using similar methodology to the one accepted by EPA, it is clear that the PM_{10} concentrations observed at the Rillito monitor on November 4, 2011, were well above normal historical fluctuations. This analysis provides evidence that the event affected air quality on a historic scale.

[2] Excluding days on which concentrations caused by exceptional events exceed the 95th percentile threshold employs a general test of statistical significance and has the effect of ensuring that such concentrations would clearly fall beyond the range of normal expectations for air quality during a particular time of year. Source: "The treatment of Data Influenced by Exceptional Events," 71 FR 12598.

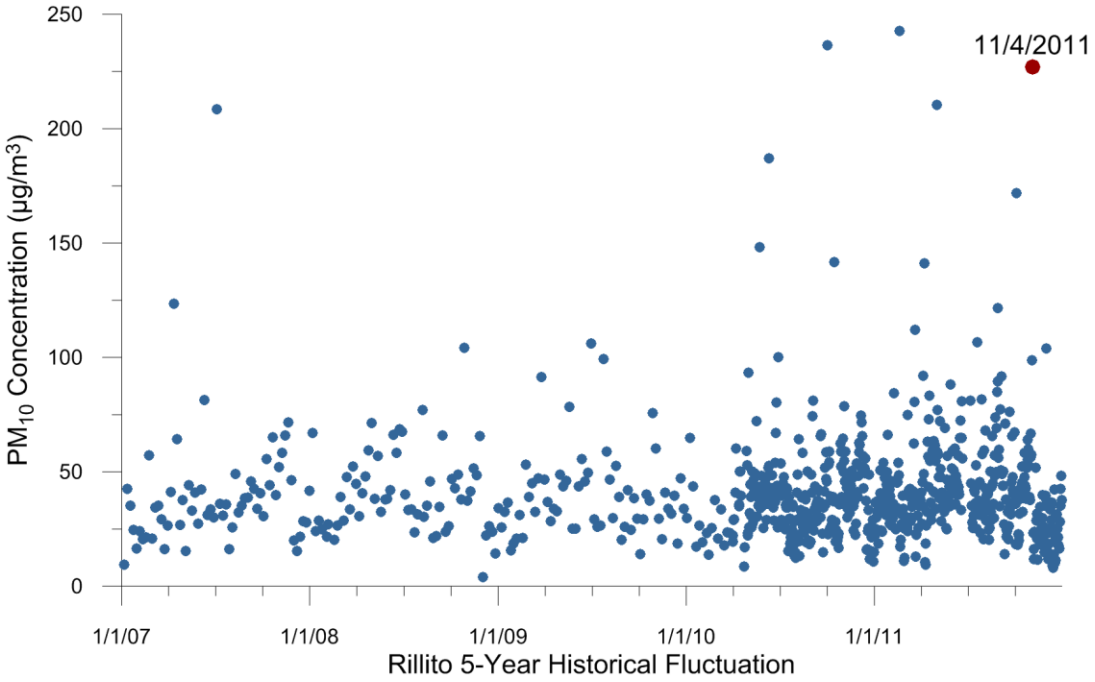

Figure 4-1. 24-hr average PM_{10} concentrations at the Rillito monitor for 2007-2011. The 24-hr average PM_{10} concentration on November 4, 2011, is highlighted in red. Prior to April 1, 2010, the Rillito monitor operated on a 1-in-6 day schedule.

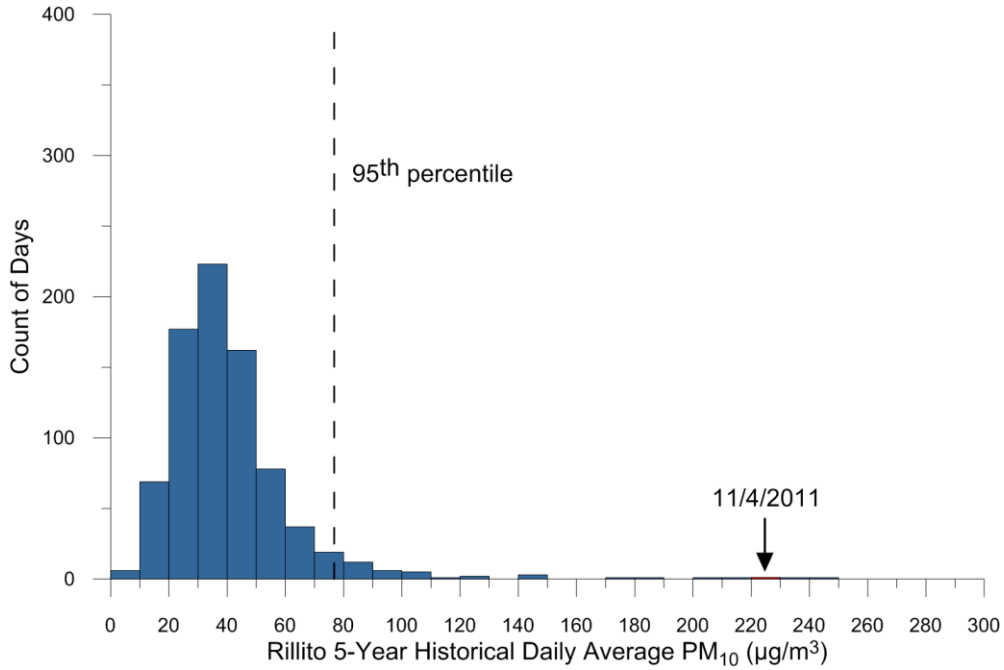

Figure 4-2. 24-hr average PM_{10} concentrations at the Rillito monitor for 2007-2011. The 24-hr average PM_{10} concentration on November 4, 2011, was in excess of the 95th percentile. The value is also above the 95th percentile when considering only the continuous data since April 1, 2010.

5. Not Reasonably Controllable or Preventable

5.1 Background

Rillito was designated as a moderate PM_{10} nonattainment area by operation of the 1990 CAA. In 2006, following several years of improved air quality, EPA determined that the RNA had met the PM_{10} NAAQS and issued a clean data finding for the RNA. EPA's Clean Data Policy relieves the state of Arizona from certain demonstrations of attainment because qualifying for a clean data finding indicates that attainment has already been achieved. This section of the exceptional events demonstration describes the RACM implemented to bring the RNA into attainment and maintain attainment status.

5.1.1 Control Measures

Details of the RACM implemented in the RNA can be found in the *2008 RNA PM_{10} LMP and Request for Redesignation to Attainment*. The 1994 SIP submitted to EPA contained a series of control measures designed to mitigate PM_{10} emissions. Since then, the RNA has become more urbanized and less agricultural. Thus, some of the control measures included in the 1994 SIP have been discontinued or were one-time actions. **Table 5-1** provides the status of these measures.

Table 5-1. Status of control measures implemented in the RNA from the 1994 Rillito PM_{10} SIP.

Control Measure	Details	Current Status
1. CalPortland cement plant and quarry operations	Comprehensive road stabilization plan to mitigate emissions.	In effect, included in the CPC operating permit issued October 7, 2003
2. Pima County Grading Ordinance, Chapter 18.81 of the Pima County Zoning Code (January 2001)	Permits for earth moving require stabilization to mitigate fugitive emissions.	In effect
3. Bank stabilization of the Santa Cruz River	One-time control measure implemented in 1988 during the development of nearby residential neighborhoods.	Complete
4. Reduced tillage program	United States Department of Agriculture (DOA) pilot program.	Discontinued by U.S. DOA
5. Dust stabilization – Rillito community	Approximately one mile total of dirt road segments within the community are now paved.	Complete
6. Avra Valley road shoulder dust stabilization	Once per year, 2.5 miles of road shoulders undergo blading and rolling, followed by application of magnesium chloride.	In effect on an as-needed basis

The implementation of these control measures helped bring the RNA into timely attainment of the 24-hr standard; thus, the measures meet the CAA requirement for RACM for moderate PM_{10} nonattainment areas. In addition to these RACM, the Arizona Department of Transportation's (ADOT) Standard Specification Section 810 mandates that state contractors use a comprehensive series of control measures designed to mitigate airborne PM_{10} emissions during road construction projects.

5.1.2 Permanent and Enforceable Control Measures

The CAA requires that all types of maintenance plans demonstrate that measures credited with bringing an area into attainment are federally enforceable and continue into the future. Measures 1, 2, and 6 in Table 5-1 meet these requirements. Measure 4 was discontinued by the U.S. DOA and was not replaced, and measures 3 and 5 are no longer necessary because the affected public roadways have since been paved.

New major emissions sources or major modifications to existing sources in nonattainment areas are subject to AAC R18-2-403 (*Permits for Sources Located in Nonattainment Areas*). After an area is redesignated, AAC R18-2-406 (*Permit Requirements for Sources Located in Attainment and Unclassifiable Areas*) will apply for any major source(s) within the maintenance area.

5.1.3 Contingency Measures

Section 175A of the CAA requires a maintenance plan's contingency provisions to be enacted should a violation of the PM_{10} standard occur following redesignation to attainment. EPA's memo, *Limited Maintenance Plan Option for Moderate PM_{10} Nonattainment Areas* (Lydia Wegman, August 9, 2001),[3] states that contingency measures do not have to be fully adopted at the time of redesignation, but that the LMP should identify measures to be implemented if necessary.

The state commits to act promptly if an exceedance of the area's design value occurs following redesignation to attainment. Specifically, the state commits to determine that an exceedance has occurred within six months of the end of the calendar year in which that exceedance occurred. The state also commits to identify and implement the appropriate control measure(s) needed to remedy the situation by the end of the same calendar year.

A redesignated area with an LMP is also required to annually recalculate the average design value for the area to determine whether the area has continued to qualify for an LMP. If, after performing the annual recalculation, the state determines that the area no longer qualifies for an LMP, the state will commit to take actions to reduce PM_{10} concentrations sufficiently to requalify for an LMP, or will prepare a Maintenance Plan.

[3] The EPA memo regarding the LMP option for Moderate PM_{10} Nonattainment Areas can be found at http://www.epa.gov/ttn/oarpg/t1/memoranda/lmp_final.pdf.

5.1.4 Contingency Measure Trigger

The state will consider implementing the contingency measures featured in **Table 5-2** should an exceedance of the critical design value (CDV) occur. In order to prevent an exceedance from occurring, ADEQ opted to identify a specific indicator, or trigger, if PM_{10} concentrations reach a level that signals an imminent exceedance. The trigger will be used by ADEQ to determine the need to implement contingency measures in order to prevent an exceedance.

Table 5-2. Rillito area contingency control measures.

Contingency Control Measure	Implementing Entity
1. If any PM_{10} generating source within the maintenance area is found to be contributing to monitored readings above the LMP allowable limits, ADEQ will review existing air quality permits and/or applicable rules to identify additional control measures that may be needed. If a PM_{10} source does not have a permit, ADEQ will determine whether a permit and PM_{10} controls are needed.	ADEQ
2. Review and revise dust control measures for material storage piles to determine whether additional action is needed.	ADEQ
3. Pave any new unpaved public roads, vacant lots, and unpaved parking lots located in the PM_{10} maintenance area subject to limits of statutory authority.	Pima County
4. Review and, if necessary, revise existing grading ordinances.	Pima County
5. Reduce PM by paving or stabilizing unpaved or unimproved shoulders and alleys.	Pima County and Town of Marana
6. Review and, if necessary, revise standards for installation and maintenance of landscaping and screening.	Pima County
7. Review and, if necessary, revise roadway maintenance practices following exceptional events.	Pima County

Per the LMP submitted in 2008, contingency measures will be considered if ambient concentrations reach 95% of the CDV. The current CDV for the RNA is 135 $\mu g/m^3$. The causes that activated the trigger will help the state to determine the appropriate contingency measure(s) to be implemented. ADEQ believes that identifying a trigger, although not required, will increase protection of public health and help assure that the area continues to qualify for an LMP.

5.1.5 Conformity

The Transportation Conformity Rule (40 CFR Parts 51 and 93) and General Conformity Rule (58 FR 63214; November 30, 1993) apply to nonattainment areas and maintenance areas operating under maintenance plans. Under transportation conformity rules, one way to demonstrate conformity is to indicate that expected emissions from planned actions are

consistent with the emissions budget for the area. Emissions budgets in LMP areas can be treated as essentially non-constraining for the length of the maintenance period because it is unreasonable to expect that an LMP area would experience so much growth during that period of time that a violation of the PM_{10} NAAQS would result. This does not exempt an LMP area from the need to affirm conformity, but it does allow the area to demonstrate conformity without following certain requirements. For transportation conformity purposes, EPA would most likely conclude that emissions in these areas do not require a cap for the duration of the maintenance period and, therefore, that a regional emissions analysis will not be required.

General conformity requires that non-transportation-based projects in areas that have nonattainment or maintenance plans submit a description of the project to the state. The description must show either that the project will not increase the relevant emissions for the area, or that specific control measures will be applied for the duration of the project in order to prevent increased emissions.

5.1.6 Review of Source-Permitted Inspections and Public Complaints

ADEQ's Arizona Unified Repository for Information Tracking of the Environment (AZURITE) database was queried to compile a list of inspections for the permitted sources in the Rillito area around the time of the November 4, 2011, PM_{10} exceedance. An evaluation of all inspection reports, air quality complaints, compliance reports, and other documentation indicate no evidence of unusual anthropogenic-based PM_{10} emissions.

5.2 Forecasts and Warnings

Dust forecasts were released prior to the event by both ADEQ and the NWS office in Phoenix (Appendix B). The ADEQ dust control forecast issued on November 3, 2011, indicated that strong southwesterly winds of up to 50 mph with widespread blowing dust were expected on November 4. The NWS office in Tucson issued Short Term Forecasts, Wind Advisories, and High Wind Warnings for Pima and Pinal counties, including Rillito. These statements warned of the potential for winds gusts of up to 60 mph with reduced visibilities due to blowing dust.

5.3 Wind Observations

Wind gusts of up to 38 mph were reported at the Rillito monitor during this windblown dust event. The nearby Marana monitor reported wind gusts of up to 35 mph, and monitors in the Tucson area recorded sustained wind speeds of up to 29 mph and wind gusts of at least 40 mph. Winds of over 25 mph are normally sufficient to overcome most PM_{10} control measures. As was noted in Section 2.1, soils in the region between Marana/Rillito and Casa Grande are particularly prone to lofting by winds.

5.4 Summary

The weather forecasts and observations outlined in this section demonstrate that strong southwesterly winds caused uncontrollable PM_{10} emissions in the Rillito area. The RACM outlined in the Rillito PM_{10} Maintenance Plan were in place at the time of the event. These

control measures are required for areas designated as Moderate non-attainment for PM_{10}, such as Rillito. Thus, the RACM in place at the time of the event were reasonable. In addition, surface wind measurements in the immediate Rillito area (wind gusts of up to 38 mph) and in the Tucson area (wind gusts of at least 40 mph) during the event were high enough that most reasonable PM_{10} control measures would have been overwhelmed.

6. But-For Analysis

6.1 Discussion

Section 50.14(c)(3)(iv)(D) in 40 CFR Part 50 requires that an exceptional event demonstration satisfies that "[t]here would have been no exceedance or violation but for the event." The prior sections of this submittal have provided detailed information that, in regard to the PM_{10} exceedance at the Rillito monitor on November 4, 2011,

- The exceedance was not reasonably controllable or preventable, and
- There was a clear causal relationship between PM_{10} transported by strong southwesterly winds originating in desert areas outside the Rillito Nonattainment Area and the measured PM_{10} exceedance in Rillito.

The weight of evidence in these sections demonstrates that, but for the existence of dust emissions generated by strong southwesterly winds ahead of a Pacific storm system and the associated transport of PM_{10}, there would have been no exceedance of the NAAQS for 24-hr average PM_{10}.

As shown in Section 3, time-series plots of PM_{10} and wind speeds establish a clear causal relationship between the arrival of dust-laden winds and elevated PM_{10} concentrations at the Rillito monitor. Multiple independent measurements of wind speed, wind direction, and visibility all point to the presence of strong southwesterly winds as the mechanism for transport of PM_{10} into the Rillito PM_{10} Nonattainment Area. High PM_{10} concentrations and strong winds were also reported in other parts of Arizona, illustrating the regional nature of this event. In addition, PM_{10} concentrations were well below the NAAQS on days immediately before and after the windblown dust event. The source regions for the PM_{10} are clearly identified as open desert southwest of the Rillito PM_{10} Nonattainment Area. The weight of evidence presented in this submittal provides no alternative that could tie the exceedance of November 4, 2011, to any causal source except PM_{10} transported by southwesterly winds, confirming that there would have been no exceedance but for the presence of these uncontrollable natural events.

As detailed in Section 5, all reasonable control measures were in place and/or implemented on a continual basis. Air quality-related inspection and compliance data revealed no violations or complaints within three days before and after the time of the event. Local regulatory agencies, industry, and the general public were alerted to the possibility of dust storms due to strong winds ahead of an approaching Pacific storm system via daily forecasts and media reports.

6.2 Summary

The weight of evidence presented in this submittal provides no alternative that could tie the exceedance of November 4, 2011, to any causal source except PM_{10} transported by strong southwesterly winds, confirming that there would have been no exceedance but for the presence of these uncontrollable natural events.

7. Conclusions

The PM_{10} exceedance that occurred on November 4, 2011, satisfies the criteria of the EER, which states that in order to justify the exclusion of air quality monitoring data, evidence must be provided for the following elements:

1. The event satisfies the criteria set forth in 40 CFR 50.1(j) that
    a. the event affected air quality,
    b. the event was not reasonably controllable or preventable, and
    c. the event was caused by human activity unlikely to recur in a particular location or was a natural event;
2. There is a clear causal relationship between the measurement(s) under consideration and the event;
3. The event is associated with a measured concentration(s) in excess of normal historical fluctuations; and
4. There would have been no exceedance or violation but for the event.

7.1 Affects Air Quality

As stated in the preamble to the EER, the event in question is considered to have affected air quality if it can be shown that there is a clear causal relationship between the monitored exceedance and the event, and that the event is associated with a measured concentration in excess of normal historical fluctuations. Given the information presented in Sections 2, 3, 4, and 5, we can reasonably conclude that the event in question affected air quality.

7.2 Not Reasonably Controllable or Preventable

Section 50.1(j) of 40 CFR Part 50 requires that an event must be “not reasonably controllable or preventable” in order to be defined as an exceptional event. This requirement is met by demonstrating that, despite reasonable control measures in place within the Rillito PM_{10} Nonattainment Area, high winds overwhelmed all reasonably available controls. The PM_{10} exceedance discussed in this report was caused by naturally occurring southwesterly winds that transported dust into Rillito from areas largely outside the Rillito PM_{10} Nonattainment Area. These facts provide strong evidence that the PM_{10} exceedance on November 4, 2011, was not reasonably controllable or preventable.

7.3 Natural Event

As discussed above, the PM_{10} exceedance in Rillito on November 4, 2011, was shown to be caused by transport of PM_{10} into Rillito by strong southwesterly winds ahead of a Pacific storm system. The event therefore qualifies as a natural event.

7.4 Clear Causal Relationship

The following points demonstrate that the high PM_{10} concentrations were caused by windblown dust:

- Time-series of PM_{10} concentrations show that the timing of high PM_{10} at the Rillito monitor was consistent with gusty winds at Rillito-area meteorological stations (Section 3).
- High PM_{10} concentrations and gusty winds were reported at other monitors in southern Arizona, illustrating the regional, uncontrollable nature of this event (Section 3).
- PM_{10} concentrations were well below the NAAQS on days immediately before and after the windblown dust event (Section 3).
- Dry conditions preceding the event resulted in soils that were particularly susceptible to particulate suspension by high winds (Section 3).

7.5 Historical Norm

The 24-hr average PM_{10} values measured at the Rillito monitor were historically unusual compared to a multi-year data set (Section 4).

7.6 But For

On the basis of the weight of evidence described above and in Section 6, the exceedance of the federal 24-hr PM_{10} standard on November 4, 2011, at the Rillito monitor would not have occurred but for the period of strong southwesterly winds that transported dust from open desert areas southwest of Rillito into the Rillito PM_{10} Nonattainment Area.

Appendix A:
Air Quality and Meteorological Data for the Rillito Area

This section contains time-series of air quality and meteorological data for Rillito and other regional monitors on November 4 and 5, 2011. The data illustrate the increase in wind speeds and wind gusts coincident with the arrival of dust and high PM_{10} concentrations in the Rillito area.

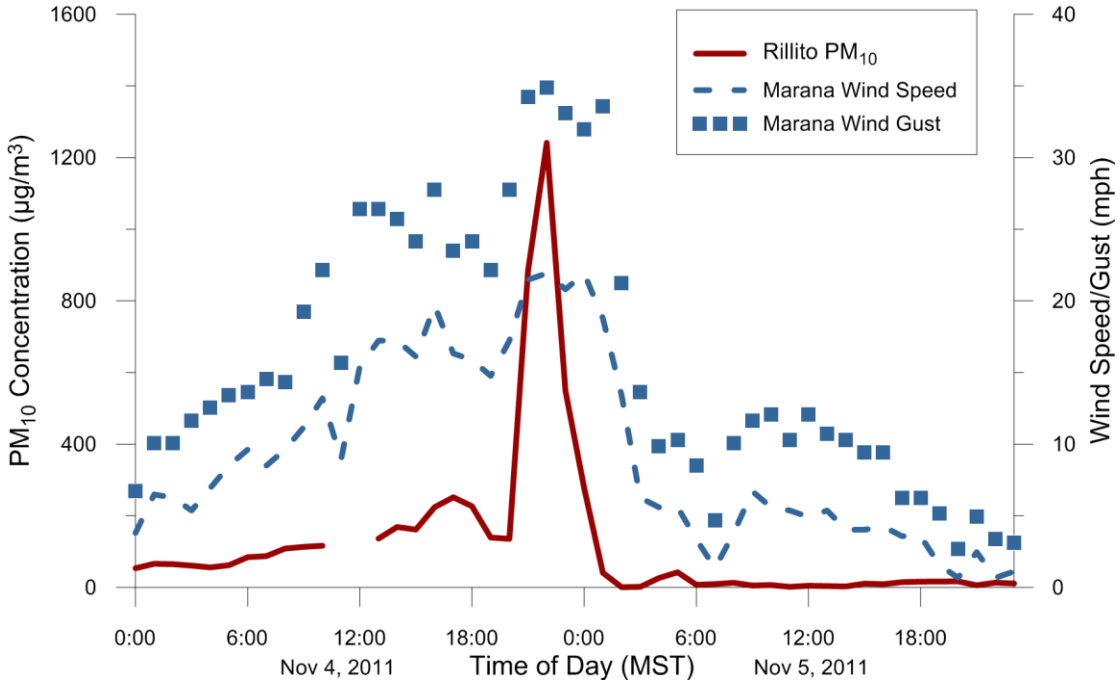

Figure A-1. Hourly PM_{10} concentrations at the Rillito monitor and wind speeds at the Marana monitor on November 4 and 5, 2011. High PM_{10} concentrations and strong winds were reported late on November 4, indicating the arrival of windblown dust.

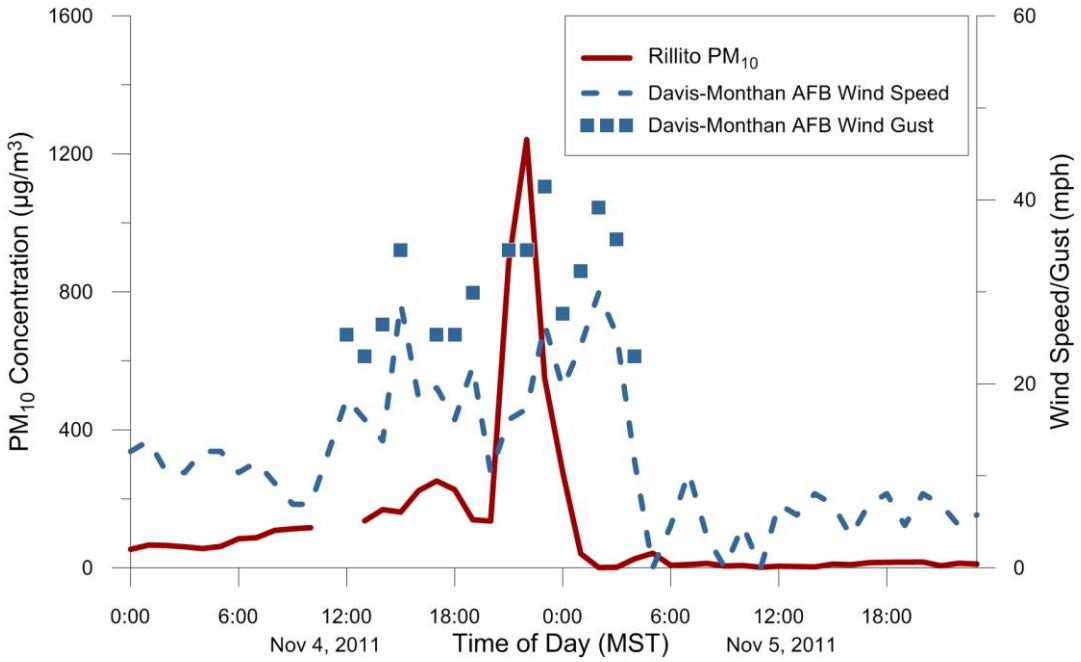

Figure A-2. Hourly PM_{10} concentrations at the Rillito monitor and wind speeds at Davis-Monthan AFB on November 4 and 5, 2011. High PM_{10} concentrations and strong winds were reported late on November 4, indicating the arrival of windblown dust.

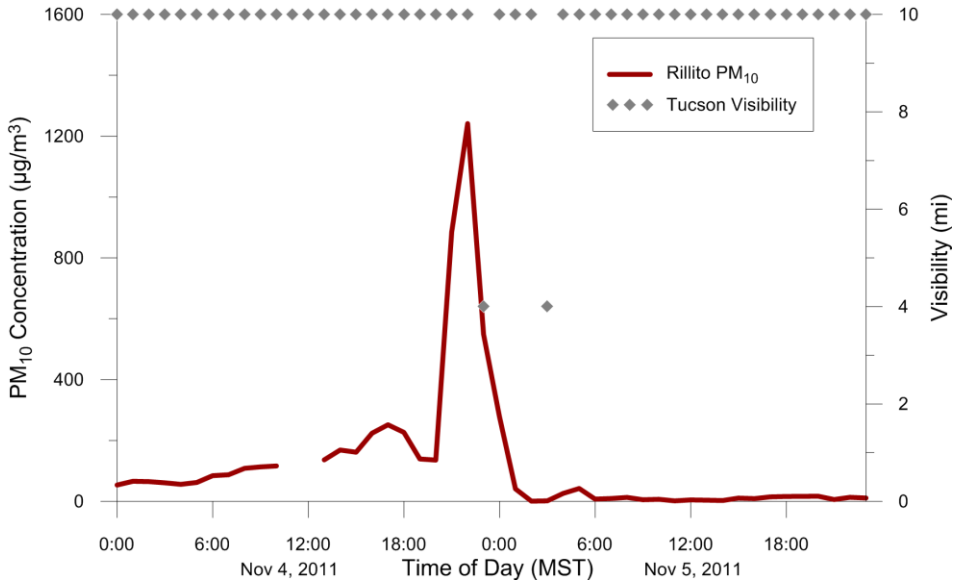

Figure A-3. Hourly PM_{10} concentrations at the Rillito monitor and visibilities at Tucson International Airport on November 4 and 5, 2011. High PM_{10} concentrations and reduced visibilities were reported late on November 4, indicating the arrival of windblown dust. The lag between the peak in PM_{10} concentrations and the visibility reduction is due to different reporting methods by the two monitors. The second visibility reduction early on November 5 was due to rain.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final)
HOURLY OBSERVATIONS TABLE
TUCSON INTERNATIONAL AIRPORT (23160)
TUCSON, AZ (11/03/2011)

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801

Elevation: 2549 ft. above sea level
Latitude: 32.131
Longitude: -110.955
Data Version: VER3

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	Dry Bulb Temp		Wet Bulb Temp		Dew Point Temp		Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti-meter (in. hg)
						(F)	(C)	(F)	(C)	(F)	(C)											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
03	0053	11	CLR	10.00		50	10.0	37	3.0	18	-7.8	28	6	180		27.48			30.08	AA		30.16
03	0153	11	CLR	10.00		50	10.0	37	3.0	18	-7.8	28	8	150		27.46			30.06	AA		30.14
03	0253	11	CLR	10.00		52	11.1	38	3.4	17	-8.3	25	9	140		27.45			30.04	AA		30.13
03	0353	11	CLR	10.00		50	10.0	37	3.0	18	-7.8	28	8	170		27.44			30.04	AA		30.12
03	0453	11	CLR	10.00		54	12.2	39	4.0	17	-8.3	23	9	170		27.44			30.03	AA		30.12
03	0553	11	CLR	10.00		61	16.1	42	5.2	11	-11.7	14	18	140		27.44			30.03	AA		30.12
03	0653	11	CLR	10.00		60	15.6	41	5.2	13	-10.6	16	15	140		27.45			30.04	AA		30.13
03	0753	11	CLR	10.00		63	17.2	43	6.0	13	-10.6	14	18	130	25	27.46			30.06	AA		30.14
03	0853	11	CLR	10.00		66	18.9	45	6.9	14	-10.0	13	21	140		27.46			30.06	AA		30.14
03	0953	11	CLR	10.00		70	21.1	47	8.2	16	-8.9	13	22	130	26	27.44			30.03	AA		30.12
03	1053	11	CLR	10.00		74	23.3	49	9.3	17	-8.3	11	14	120	24	27.42			30.01	AA		30.10
03	1153	11	CLR	10.00		79	26.1	51	10.6	18	-7.8	10	17	130		27.39			29.98	AA		30.07
03	1253	11	CLR	10.00		81	27.2	52	11.2	19	-7.2	10	14	140		27.36			29.94	AA		30.03
03	1353	11	CLR	10.00		83	28.3	53	11.8	20	-6.7	10	8	110		27.33			29.90	AA		30.00
03	1453	11	CLR	10.00		83	28.3	53	11.8	20	-6.7	10	9	120		27.31			29.88	AA		29.98
03	1553	11	CLR	10.00		83	28.3	53	11.8	20	-6.7	10	5	120		27.30			29.86	AA		29.97
03	1653	11	CLR	10.00		80	26.7	52	11.1	20	-6.7	11	10	120		27.29			29.86	AA		29.96
03	1753	11	CLR	10.00		76	24.4	51	10.3	21	-6.1	13	6	110		27.30			29.86	AA		29.97
03	1853	11	CLR	10.00		72	22.2	49	9.4	22	-5.6	15	6	120		27.31			29.88	AA		29.98
03	1953	11	CLR	10.00		71	21.7	48	9.0	21	-6.1	15	8	090		27.31			29.88	AA		29.98
03	2053	11	CLR	10.00		67	19.4	47	8.2	22	-5.6	18	8	080		27.31			29.88	AA		29.98
03	2153	11	CLR	10.00		67	19.4	47	8.2	22	-5.6	18	8	140		27.30			29.86	AA		29.97
03	2253	11	CLR	10.00		63	17.2	46	7.5	24	-4.4	23	9	160		27.29			29.86	AA		29.96
03	2353	11	CLR	10.00		66	18.9	46	7.9	22	-5.6	19	11	130		27.28			29.83	AA		29.95

Figure A-4. Quality-controlled local climatological data hourly observations table for Tucson International Airport, Tucson, AZ (11/03/2011). Dynamically generated via http://cdo.ncdc.noaa.gov/qclcd/QCLCD.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final)
HOURLY OBSERVATIONS TABLE
TUCSON INTERNATIONAL AIRPORT (23160)
TUCSON, AZ (11/04/2011)

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801

Elevation: 2549 ft. above sea level
Latitude: 32.131
Longitude: -110.955
Data Version: VER3

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	Dry Bulb Temp		Wet Bulb Temp		Dew Point Temp		Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti-meter (in. hg)
						(F)	(C)	(F)	(C)	(F)	(C)											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
04	0053	11	CLR	10.00		56	13.3	43	6.1	27	-2.8	33	0	000		27.28			29.84	AA		29.95
04	0153	11	CLR	10.00		53	11.7	42	5.5	28	-2.2	38	0	000		27.27			29.83	AA		29.93
04	0253	11	CLR	10.00		53	11.7	42	5.3	27	-2.8	37	5	180		27.26			29.82	AA		29.92
04	0353	11	CLR	10.00		58	14.4	43	6.1	24	-4.4	27	5	180		27.25			29.80	AA		29.91
04	0453	11	CLR	10.00		55	12.8	42	5.3	24	-4.4	30	8	160		27.26			29.82	AA		29.92
04	0553	11	CLR	10.00		57	13.9	43	5.9	24	-4.4	28	6	130		27.26			29.82	AA		29.92
04	0653	11	CLR	10.00		54	12.2	41	5.2	25	-3.9	33	5	120		27.26			29.84	AA		29.92
04	0753	11	CLR	10.00		61	16.1	45	7.1	25	-3.9	25	8	130		27.26			29.83	AA		29.92
04	0853	11	CLR	10.00		68	20.0	48	9.0	26	-3.3	21	8	110		27.25			29.81	AA		29.91
04	0953	11	CLR	10.00		73	22.8	51	10.6	28	-2.2	19	8	170		27.25			29.80	AA		29.91
04	1053	11	CLR	10.00		76	24.4	51	10.7	24	-4.4	14	21	190	30	27.22			29.77	AA		29.88
04	1153	11	CLR	10.00		77	25.0	52	10.9	24	-4.4	14	17	170	29	27.18			29.72	AA		29.84
04	1253	11	CLR	10.00		80	26.7	52	11.3	22	-5.6	12	17	190	31	27.14			29.69	AA		29.80
04	1353	11	CLR	10.00		79	26.1	52	11.3	24	-4.4	13	18	210	26	27.11			29.66	AA		29.76
04	1453	11	CLR	10.00		80	26.7	54	12.1	28	-2.2	15	24	190	31	27.10			29.64	AA		29.75
04	1553	11	CLR	10.00		78	25.6	55	12.5	33	0.6	19	21	180	26	27.08			29.63	AA		29.73
04	1653	11	CLR	10.00		75	23.9	54	12.4	36	2.2	24	22	210	30	27.08			29.63	AA		29.73
04	1753	11	CLR	10.00		73	22.8	55	12.6	39	3.9	29	16	190	23	27.07			29.63	AA		29.72
04	1853	11	FEW075	10.00		71	21.7	56	13.1	43	6.1	37	24	180	33	27.07			29.64	AA		29.72
04	1953	11	OVC060	10.00		70	21.1	58	14.4	49	9.4	47	9	220		27.08			29.63	AA		29.73
04	2053	11	BKN055 OVC070	10.00		68	20.0	58	14.2	50	10.0	53	11	230	22	27.07			29.62	AA		29.72
04	2153	11	OVC050	10.00		66	18.9	56	13.5	49	9.4	54	21	220	28	27.10			29.64	AA		29.75
04	2251	11	FEW004 BKN011 OVC060	4.00	HZ	64	18.0	54	12.0	45	7.0	50	24	210	38	27.10			M	SP		29.75
04	2253	11	FEW004 BKN011 OVC060	4.00	HZ	64	17.8	54	12.0	45	7.2	50	29	210	40	27.11			29.65	AA		29.76
04	2325	11	OVC017	5.00	HZ	63	17.0	52	11.3	43	6.0	48	22	200	33	27.08			M	SP		29.73
04	2351	11	SCT021	10.00		63	17.0	52	11.3	43	6.0	48	14	230	26	27.08			M	SP		29.73
04	2353	11	FEW019	10.00		63	17.2	52	11.3	43	6.1	48	20	220	32	27.08			29.62	AA		29.73

Figure A-5. Quality-controlled local climatological data hourly observations table for Tucson International Airport, Tucson, AZ (11/04/2011). Strong south-southwesterly winds were reported much of the day. Visibilities were also reduced with haze (HZ) reported. Dynamically generated via http://cdo.ncdc.noaa.gov/qclcd/QCLCD.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final)
HOURLY OBSERVATIONS TABLE
TUCSON INTERNATIONAL AIRPORT (23160)
TUCSON, AZ (11/05/2011)

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801

Elevation: 2549 ft. above sea level
Latitude: 32.131
Longitude: -110.955
Data Version: VER3

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	Dry Bulb Temp		Wet Bulb Temp		Dew Point Temp		Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti-meter (in. hg)
						(F)	(C)	(F)	(C)	(F)	(C)											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
05	0053	11	SCT039 SCT070 BKN090	10.00		60	15.6	53	11.9	48	8.9	65	18	200	29	27.11			29.65	AA		29.76
05	0153	11	FEW044 OVC090	10.00		59	15.0	52	10.8	45	7.2	60	20	230	40	27.12			29.67	AA		29.77
05	0206	11	FEW012 BKN019 OVC090	10.00		48	9.0	46	8.0	45	7.0	89	22	290	34	27.14			M	SP		29.80
05	0240	11	FEW014 BKN034 OVC043	4.00	+RA BR	45	7.0	44	6.6	43	6.0	93	24	300	32	27.18			M	SP		29.84
05	0253	11	BKN039 OVC047	6.00	RA BR	44	6.7	43	6.1	42	5.6	93	20	300	34	27.19			29.77	AA	0.11	29.85
05	0353	11	OVC048	10.00	-RA	43	6.1	M	M	M	M	M	15	290	22	27.23			29.81	AA	0.07	29.89
05	0453	11	FEW015 OVC046	10.00		44	6.7	43	5.8	41	5.0	89	6	110		27.26			29.85	AA	T	29.92
05	0553	11	FEW040 OVC070	10.00		45	7.2	44	6.4	42	5.6	89	9	090		27.27			29.86	AA		29.93
05	0653	11	CLR	10.00		45	7.2	43	6.1	41	5.0	86	8	120		27.28			29.88	AA		29.95
05	0753	11	CLR	10.00		46	7.8	44	6.6	42	5.6	86	3	130		27.30			29.91	AA		29.97
05	0853	11	CLR	10.00		49	9.4	45	7.2	41	5.0	74	0	000		27.34			29.94	AA		30.01
05	0953	11	CLR	10.00		51	10.6	45	7.3	39	3.9	64	3	VR		27.36			29.96	AA		30.03
05	1053	11	CLR	10.00		54	12.2	47	8.1	39	3.9	57	3	250		27.37			29.97	AA		30.04
05	1153	11	CLR	10.00		57	13.9	47	8.4	37	2.8	47	5	VR		27.35			29.95	AA		30.02
05	1253	11	FEW050	10.00		59	15.0	47	8.5	35	1.7	41	6	350		27.33			29.93	AA		30.00
05	1353	11	CLR	10.00		60	15.6	47	8.3	33	0.6	36	3	300		27.30			29.90	AA		29.97
05	1453	11	CLR	10.00		60	15.6	47	8.1	32	0.0	35	5	290		27.30			29.91	AA		29.97
05	1553	11	CLR	10.00		61	16.1	47	8.2	31	-0.6	32	7	300		27.30			29.91	AA		29.97
05	1653	11	CLR	10.00		59	15.0	46	7.8	32	0.0	36	5	300		27.29			29.91	AA		29.96
05	1753	11	CLR	10.00		57	13.9	46	7.7	34	1.1	42	5	310		27.29			29.91	AA		29.96
05	1853	11	SCT070	10.00		55	12.8	46	7.6	36	2.2	49	5	340		27.32			29.94	AA		29.99
05	1953	11	BKN070	10.00		54	12.2	46	7.6	37	2.8	53	7	330		27.32			29.95	AA		29.99
05	2053	11	OVC070	10.00		54	12.2	46	7.6	37	2.8	53	3	310		27.34			29.96	AA		30.01
05	2153	11	OVC065	10.00		52	11.1	47	8.0	41	5.0	66	5	270		27.34			29.96	AA		30.01
05	2253	11	OVC065	10.00		51	10.6	46	7.8	41	5.0	69	7	270		27.34			29.96	AA		30.01
05	2353	11	OVC060	10.00		50	10.0	45	7.2	40	4.4	69	5	270		27.34			29.95	AA		30.01

Figure A-6. Quality-controlled local climatological data hourly observations table for Tucson International Airport, Tucson, AZ (11/05/2011). Winds shifted to west-northwesterly and rain was reported after 02:00 MST following cold frontal passage. Dynamically generated via http://cdo.ncdc.noaa.gov/qclcd/QCLCD.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final)
HOURLY OBSERVATIONS TABLE
DAVIS-MONTHAN AFB AIRPORT (23109)
TUCSON, AZ (11/03/2011)

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801

Elevation: 2704 ft. above sea level
Latitude: 32.166
Longitude: -110.883
Data Version: VER2

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	Dry Bulb Temp		Wet Bulb Temp		Dew Point Temp		Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti-meter (in. hg)
						(F)	(C)	(F)	(C)	(F)	(C)											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
03	0055	0	CLR	10.00		51	10.4	38	3.2	18	-7.7	27	7	140		27.30			30.06	AA		30.13
03	0155	0	CLR	10.00		49	9.2	37	2.7	18	-8.0	29	8	150		27.30			30.06	AA		30.13
03	0255	0	CLR	10.00		57	13.8	40	4.4	14	-10.1	18	13	120		27.28			30.02	AA		30.11
03	0355	0	CLR	10.00		58	14.5	40	4.5	12	-10.9	16	14	120		27.27			30.00	AA		30.10
03	0455	0	CLR	10.00		58	14.7	40	4.4	11	-11.5	15	9	090		27.27			29.99	AA		30.09
03	0555	0	CLR	10.00		60	15.6	41	4.9	11	-11.7	14	14	120		27.27			30.00	AA		30.09
03	0655	0	CLR	10.00		60	15.6	41	5.2	13	-10.8	16	16	120		27.27			30.02	AA		30.10
03	0755	0	CLR	10.00		62	16.5	43	5.8	14	-10.1	15	29	130	37	27.29			30.05	AA		30.12
03	0855	0	CLR	10.00		66	18.9	45	7.1	16	-9.0	14	24	120	31	27.28			30.03	AA		30.11
03	0955	0	CLR	10.00		70	21.1	47	8.0	15	-9.2	12	22	120	31	27.27			30.02	AA		30.10
03	1055	0	CLR	10.00		73	23.0	48	8.9	16	-8.8	11	18	120		27.26			30.01	AA		30.08
03	1155	0	CLR	10.00		77	25.0	50	10.0	17	-8.1	10	17	110		27.23			29.97	AA		30.05
03	1255	0	CLR	10.00		81	27.1	52	10.9	17	-8.1	9	10	140		27.19			29.91	AA		30.01
03	1355	0	CLR	10.00		82	27.5	53	11.5	20	-6.5	10	7	090		27.16			29.90	AA		29.98
03	1455	0	CLR	10.00		82	28.0	53	11.4	19	-7.1	9	5	VR		27.15			29.85	AA		29.96
03	1555	0	CLR	10.00		83	28.1	53	11.6	19	-7.1	9	0	000		27.14			29.83	AA		29.95
03	1655	0	CLR	10.00		79	26.3	52	10.9	21	-6.1	11	9	130		27.14			29.83	AA		29.95
03	1755	0	CLR	10.00		75	24.1	50	10.1	22	-5.8	14	7	080		27.14			29.84	AA		29.95
03	1855	0	CLR	10.00		70	21.3	48	8.9	22	-5.7	16	7	090		27.15			29.87	AA		29.96
03	1955	0	CLR	10.00		69	20.3	48	8.7	22	-5.8	17	7	100		27.15			29.87	AA		29.96
03	2055	0	CLR	10.00		67	19.3	47	8.2	22	-5.7	18	13	100		27.15			29.86	AA		29.96
03	2155	0	CLR	10.00		67	19.7	47	8.2	22	-5.8	18	7	080		27.14			29.84	AA		29.95
03	2255	0	CLR	10.00		67	19.2	47	8.2	22	-5.5	18	17	120		27.13			29.82	AA		29.94
03	2355	0	CLR	10.00		65	18.4	46	7.6	22	-5.4	19	13	130		27.12			29.80	AA		29.93

Figure A-7. Quality-controlled local climatological data hourly observations table for Davis-Monthan AFB, Tucson, AZ (11/03/2011). Dynamically generated via http://cdo.ncdc.noaa.gov/qclcd/QCLCD.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final)
HOURLY OBSERVATIONS TABLE
DAVIS-MONTHAN AFB AIRPORT (23109)
TUCSON, AZ (11/04/2011)

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801

Elevation: 2704 ft. above sea level
Latitude: 32.166
Longitude: -110.883
Data Version: VER2

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	Dry Bulb Temp		Wet Bulb Temp		Dew Point Temp		Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti-meter (in. hg)
						(F)	(C)	(F)	(C)	(F)	(C)											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
04	0055	0	CLR	10.00		64	17.9	46	7.5	23	-5.2	21	14	130		27.12			29.80	AA		29.93
04	0155	0	CLR	10.00		62	16.7	44	6.9	22	-5.5	21	10	120		27.10			29.78	AA		29.91
04	0255	0	CLR	10.00		61	16.0	44	6.8	23	-5.2	23	10	130		27.09			29.77	AA		29.90
04	0355	0	CLR	10.00		60	15.5	43	6.3	22	-5.4	23	13	130		27.08			29.76	AA		29.89
04	0455	0	CLR	10.00		60	15.5	44	6.5	23	-4.9	24	13	140		27.09			29.78	AA		29.90
04	0555	0	CLR	10.00		59	14.8	43	6.2	23	-4.9	25	10	130		27.09			29.80	AA		29.90
04	0655	0	CLR	10.00		58	14.3	43	6.0	23	-4.8	26	11	120		27.10			29.82	AA		29.91
04	0755	0	CLR	10.00		60	15.6	44	6.7	24	-4.6	25	9	120		27.10			29.82	AA		29.91
04	0855	0	CLR	10.00		67	19.3	48	8.8	26	-3.4	21	7	130		27.08			29.79	AA		29.89
04	0955	0	CLR	10.00		72	22.2	50	10.0	26	-3.1	18	7	120		27.08			29.77	AA		29.89
04	1055	0	FEW180	10.00		75	24.0	51	10.5	25	-3.9	15	13	170		27.06			29.74	AA		29.87
04	1155	0	CLR	10.00		78	25.7	52	10.9	23	-4.9	13	18	170	25	27.02			29.69	AA		29.82
04	1255	0	CLR	10.00		79	25.9	52	11.3	24	-4.3	13	16	180	23	26.98			29.65	AA		29.78
04	1355	0	CLR	10.00		79	25.9	51	10.8	20	-6.5	11	14	200	26	26.94			29.62	AA		29.74
04	1455	0	CLR	10.00		79	26.0	53	11.9	28	-2.3	15	29	190	34	26.92			29.60	AA		29.72
04	1555	0	FEW200	10.00		77	25.2	54	11.9	31	-0.3	19	18	180		26.92			29.61	AA		29.72
04	1655	0	CLR	10.00		75	24.0	54	12.2	35	1.9	23	20	180	25	26.92			29.61	AA		29.72
04	1755	0	CLR	10.00		72	22.3	54	12.2	38	3.2	29	16	180	25	26.92			29.61	AA		29.72
04	1855	0	FEW080	10.00		71	21.6	55	12.8	42	5.7	35	22	180	30	26.91			29.62	AA		29.71
04	1955	0	SCT060	10.00		71	21.5	56	13.5	45	7.3	39	10	210		26.90			29.60	AA		29.70
04	2055	0	FEW065	10.00		69	20.5	57	13.6	47	8.5	46	16	190	34	26.90			29.59	AA		29.70
04	2155	0	FEW065	10.00		67	19.7	55	12.9	46	7.6	47	17	200	34	26.93			29.61	AA		29.73
04	2241	0	FEW049	8.00		64	18.0	54	12.2	46	8.0	52	22	210	39	26.94			29.62	AA		29.74
04	2255	0	FEW049	7.00		64	17.6	54	12.0	45	7.2	50	21	210	41	26.94			29.62	AA		29.74
04	2258	0	FEW049	8.00		64	18.0	54	12.0	45	7.0	50	26	210	41	26.94	3	011	29.62	AA		29.74
04	2355	0	SCT060	10.00		63	17.2	52	11.2	43	5.9	48	20	180	28	26.92			29.60	AA		29.72

Figure A-8. Quality-controlled local climatological data hourly observations table for Davis-Monthan AFB, Tucson, AZ (11/04/2011). Strong south-southwesterly winds were reported much of the day. Visibilities were also reduced between 22:00 and 23:00 MST. Dynamically generated via http://cdo.ncdc.noaa.gov/qclcd/QCLCD.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration

LOCAL CLIMATOLOGICAL DATA (final)
HOURLY OBSERVATIONS TABLE
DAVIS-MONTHAN AFB AIRPORT (23109)
TUCSON, AZ (11/05/2011)

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801

Elevation: 2704 ft. above sea level
Latitude: 32.166, Longitude: -110.883

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	Dry Bulb Temp		Wet Bulb Temp		Dew Point Temp		Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti-meter (in. hg)
						(F)	(C)	(F)	(C)	(F)	(C)											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
05	0055	0	FEW070	10.00		60	15.4	53	11.6	47	8.2	62	24	220	32	26.93			29.61	AA		29.73
05	0155	0	SCT039 BKN095	10.00		58	14.5	51	10.6	45	7.4	62	21	220	29	26.95			29.63	AA		29.75
05	0208	0	FEW020 SCT029 BKN041	10.00		57	14.0	51	10.3	45	7.0	64	28	290	39	26.97			29.66	AA	0.15	29.77
05	0214	0	FEW020 SCT028 BKN041	10.00	-DZ	52	11.0	47	8.5	43	6.0	72	25	290	34	26.98			29.68	AA	0.15	29.78
05	0225	0	SCT022 SCT029 BKN041	6.00	-RA	48	9.0	46	7.5	43	6.0	83	30	300	34	27.01			29.72	AA	0.15	29.81
05	0227	0	SCT022 BKN029 BKN041	5.00	+RA	46	8.0	45	6.9	43	6.0	89	22	290	34	27.01			29.72	AA	0.15	29.81
05	0253	0	FEW012 BKN021	7.00	+RA	45	7.0	43	6.1	41	5.0	86	23	300	36	27.02			29.75	AA	0.15	29.82
05	0255	0	FEW012 BKN021	8.00	+RA	44	6.5	43	5.8	41	4.8	89	23	300	33	27.03			29.75	AA	0.15	29.83
05	0258	0	FEW012 SCT021	9.00	+RA	43	6.0	42	5.5	41	5.0	93	25	300	33	27.03			29.76	AA	0.15	29.84
05	0355	0	CLR	10.00	-RA	43	6.1	42	5.5	41	4.8	93	11	300	23	27.06			29.80	AA	0.07	29.87
05	0425	0	BKN013	10.00	-DZ	43	6.0	42	5.5	41	5.0	93	6	320		27.07			29.81	AA	T	29.88
05	0427	0	SCT013	10.00	-DZ	43	6.0	42	5.5	41	5.0	93	5	310		27.07			29.81	AA	T	29.88
05	0452	0	FEW013	10.00		43	6.0	42	5.5	41	5.0	93	0	000		27.09			29.84	AA	T	29.90
05	0455	0	FEW046	10.00		44	6.4	42	5.6	40	4.7	86	0	000		27.09			29.84	AA	T	29.90
05	0555	0	BKN070 BKN085	10.00		44	6.9	43	5.8	41	4.8	89	5	130		27.10			29.85	AA		29.91
05	0655	0	CLR	10.00		44	6.6	43	5.8	41	4.8	89	10	130		27.12			29.87	AA		29.93
05	0755	0	CLR	10.00		46	7.7	44	6.6	42	5.4	86	3	070		27.15			29.89	AA		29.96
05	0855	0	FEW029	10.00		50	9.8	45	7.2	40	4.6	69	0	000		27.17			29.93	AA		29.99
05	0955	0	CLR	10.00		51	10.5	45	7.3	39	3.7	64	5	VR		27.19			29.95	AA		30.01
05	1055	0	CLR	10.00		53	11.5	45	7.3	37	2.7	55	0	000		27.20			29.96	AA		30.02
05	1155	0	CLR	10.00		55	12.7	45	7.2	34	1.3	45	7	VR		27.18			29.94	AA		30.00
05	1255	0	CLR	10.00		57	13.9	46	7.9	35	1.7	44	6	VR		27.16			29.92	AA		29.98
05	1355	0	CLR	10.00		58	14.5	46	7.8	33	0.3	39	8	260		27.14			29.91	AA		29.95
05	1455	0	CLR	10.00		59	15.0	46	7.8	32	-0.1	36	7	290		27.14			29.93	AA		29.95
05	1555	0	CLR	10.00		60	15.5	46	7.9	31	-0.6	34	3	260		27.14			29.93	AA		29.95
05	1655	0	CLR	10.00		59	14.9	46	7.6	31	-0.7	35	7	310		27.13			29.92	AA		29.94
05	1755	0	CLR	10.00		56	13.5	45	7.3	33	0.7	42	8	330		27.14			29.93	AA		29.95
05	1855	0	CLR	10.00		54	12.4	45	7.4	36	2.2	51	5	320		27.16			29.96	AA		29.97
05	1955	0	BKN070	10.00		53	11.5	45	7.3	37	2.5	55	8	300		27.16			29.96	AA		29.97
05	2055	0	OVC070	10.00		53	11.5	46	7.6	38	3.4	57	7	300		27.17			29.97	AA		29.99
05	2155	0	OVC065	10.00		52	11.2	46	7.8	40	4.5	64	5	270		27.17			29.97	AA		29.99
05	2255	0	OVC065	10.00		53	11.4	46	7.8	39	3.9	59	6	270		27.17			29.97	AA		29.99
05	2355	0	OVC065	10.00		52	10.9	45	7.3	38	3.6	59	6	290		27.17			29.96	AA		29.99

Figure A-9. Quality-controlled local climatological data hourly observations table for Davis-Monthan AFB, Tucson, AZ (11/05/2011). Winds shifted to west-northwesterly and rain was reported after 02:00 MST following cold frontal passage. Dynamically generated via http://cdo.ncdc.noaa.gov/qclcd/QCLCD.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final)
HOURLY OBSERVATIONS TABLE
CASA GRANDE MUNICIPAL ARPT (03914)
CASA GRANDE, AZ (11/03/2011)

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801

Elevation: 1462 ft. above sea level
Latitude: 32.95
Longitude: -111.766
Data Version: VER2

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	Dry Bulb Temp		Wet Bulb Temp		Dew Point Temp		Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti-meter (in. hg)
						(F)	(C)	(F)	(C)	(F)	(C)											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
03	0015	0	CLR	10.00		54	12.0	37	2.8	5	-15.0	14	5	350		28.55			M	AA		30.11
03	0035	0	CLR	10.00		54	12.0	37	2.7	3	-16.0	12	0	000		28.54			M	AA		30.10
03	0055	0	CLR	10.00		52	11.0	36	2.2	5	-15.0	15	0	000		28.54			M	AA		30.10
03	0115	0	CLR	10.00		52	11.0	36	2.2	5	-15.0	15	0	000		28.54			M	AA		30.10
03	0135	0	CLR	10.00		52	11.0	36	2.2	5	-15.0	15	0	000		28.54			M	AA		30.10
03	0155	0	CLR	10.00		48	9.0	34	1.0	5	-15.0	17	3	130		28.54			M	AA		30.10
03	0215	0	CLR	10.00		48	9.0	35	1.5	10	-12.0	21	0	000		28.53			M	AA		30.09
03	0235	0	CLR	10.00		45	7.0	32	0.2	7	-14.0	21	0	000		28.53			M	AA		30.09
03	0255	0	CLR	10.00		46	8.0	33	0.7	9	-13.0	22	6	100		28.53			M	AA		30.09
03	0315	0	CLR	10.00		46	8.0	34	0.9	10	-12.0	23	3	070		28.52			M	AA		30.08
03	0335	0	CLR	10.00		45	7.0	33	0.4	9	-13.0	23	6	040		28.52			M	AA		30.08
03	0355	0	CLR	10.00		45	7.0	33	0.5	10	-12.0	24	3	040		28.52			M	AA		30.08
03	0415	0	CLR	10.00		43	6.0	31	-0.3	7	-14.0	23	6	040		28.52			M	AA		30.08
03	0435	0	CLR	10.00		45	7.0	33	0.4	9	-13.0	23	3	060		28.52			M	AA		30.08
03	0455	0	CLR	10.00		45	7.0	33	0.4	9	-13.0	23	0	000		28.52			M	AA		30.08
03	0515	0	CLR	10.00		45	7.0	33	0.4	9	-13.0	23	0	000		28.52			M	AA		30.08
03	0535	0	CLR	10.00		43	6.0	31	-0.3	7	-14.0	23	0	000		28.52			M	AA		30.08
03	0555	0	CLR	10.00		43	6.0	32	-0.1	9	-13.0	25	6	020		28.52			M	AA		30.08
03	0615	0	CLR	10.00		43	6.0	32	-0.0	10	-12.0	26	8	010		28.52			M	AA		30.08
03	0635	0	CLR	10.00		43	6.0	32	-0.0	10	-12.0	26	6	010		28.52			M	AA		30.08
03	0655	0	CLR	10.00		43	6.0	32	-0.1	9	-13.0	25	5	020		28.53			M	AA		30.09
03	0715	0	CLR	10.00		46	8.0	34	0.9	10	-12.0	23	0	000		28.53			M	AA		30.09
03	0735	0	CLR	10.00		46	8.0	34	0.9	10	-12.0	23	0	000		28.54			M	AA		30.10
03	0755	0	CLR	10.00		52	11.0	37	2.9	12	-11.0	20	0	000		28.54			M	AA		30.10
03	0815	0	CLR	10.00		55	13.0	39	4.1	14	-10.0	20	0	000		28.55			M	AA		30.11
03	0835	0	CLR	10.00		55	13.0	39	3.8	12	-11.0	18	0	000		28.55			M	AA		30.11
03	0855	0	CLR	10.00		57	14.0	40	4.6	14	-10.0	18	3	230		28.55			M	AA		30.11
03	0915	0	CLR	10.00		61	16.0	43	6.0	16	-9.0	17	0	000		28.54			M	AA		30.10
03	0935	0	CLR	10.00		63	17.0	44	6.5	16	-9.0	16	0	000		28.54			M	AA		30.10
03	0955	0	CLR	10.00		64	18.0	45	7.1	18	-8.0	17	0	000		28.54			M	AA		30.10
03	1015	0	CLR	10.00		64	18.0	45	7.1	18	-8.0	17	0	000		28.53			M	AA		30.09
03	1035	0	CLR	10.00		66	19.0	46	7.7	19	-7.0	16	3	090		28.52			M	AA		30.08
03	1055	0	CLR	10.00		70	21.0	48	9.0	21	-6.0	16	8	090		28.51			M	AA		30.07
03	1115	0	CLR	10.00		72	22.0	49	9.5	21	-6.0	14	7	100		28.51			M	AA		30.06

03	1135	0	CLR	10.00		73	23.0	50	9.8	21	-6.0	14	8	090		28.49			M	AA		30.05
03	1155	0	CLR	10.00		75	24.0	51	10.5	23	-5.0	14	11	110		28.48			M	AA		30.04
03	1215	0	CLR	10.00		75	24.0	51	10.2	21	-6.0	13	5	080		28.48			M	AA		30.03
03	1235	0	CLR	10.00		75	24.0	51	10.2	21	-6.0	13	9	090		28.46			M	AA		30.01
03	1255	0	CLR	10.00		77	25.0	51	10.7	21	-6.0	12	8	110		28.45			M	AA		30.00
03	1315	0	CLR	10.00		77	25.0	51	10.7	21	-6.0	12	7	130		28.44			M	AA		29.99
03	1335	0	CLR	10.00		77	25.0	51	10.7	21	-6.0	12	5	100		28.42			M	AA		29.97
03	1355	0	CLR	10.00		79	26.0	52	11.2	21	-6.0	11	3	150		28.42			M	AA		29.97
03	1415	0	CLR	10.00		79	26.0	52	11.2	21	-6.0	11	5	110		28.41			M	AA		29.96
03	1435	0	CLR	10.00		79	26.0	52	11.2	21	-6.0	11	3	180		28.40			M	AA		29.95
03	1455	0	CLR	10.00		79	26.0	52	11.2	21	-6.0	11	0	000		28.39			M	AA		29.94
03	1515	0	CLR	10.00		79	26.0	52	11.2	21	-6.0	11	0	000		28.38			M	AA		29.93
03	1535	0	CLR	10.00		79	26.0	52	11.2	21	-6.0	11	0	000		28.38			M	AA		29.93
03	1555	0	CLR	10.00		79	26.0	52	11.2	21	-6.0	11	0	000		28.37			M	AA		29.92
03	1615	0	CLR	10.00		79	26.0	52	11.2	21	-6.0	11	0	000		28.37			M	AA		29.92
03	1635	0	CLR	10.00		79	26.0	52	11.2	21	-6.0	11	0	000		28.36			M	AA		29.91
03	1655	0	CLR	10.00		79	26.0	52	11.2	21	-6.0	11	3	220		28.36			M	AA		29.91
03	1715	0	CLR	10.00		79	26.0	52	10.9	19	-7.0	10	3	220		28.36			M	AA		29.91
03	1735	0	CLR	10.00		75	24.0	50	10.0	19	-7.0	12	3	220		28.36			M	AA		29.91
03	1755	0	CLR	10.00		73	23.0	49	9.4	18	-8.0	12	0	000		28.36			M	AA		29.91
03	1815	0	CLR	10.00		72	22.0	48	9.1	18	-8.0	13	0	000		28.36			M	AA		29.91
03	1835	0	CLR	10.00		68	20.0	46	7.8	16	-9.0	13	0	000		28.36			M	AA		29.91
03	1855	0	CLR	10.00		66	19.0	45	7.3	16	-9.0	14	5	010		28.36			M	AA		29.91
03	1915	0	CLR	10.00		64	18.0	45	7.0	18	-8.0	17	8	360		28.36			M	AA		29.91
03	1935	0	CLR	10.00		66	19.0	46	7.6	18	-8.0	16	3	340		28.35			M	AA		29.90
03	1955	0	CLR	10.00		66	19.0	46	7.6	18	-8.0	16	6	350		28.35			M	AA		29.90
03	2015	0	CLR	10.00		66	19.0	46	7.6	18	-8.0	16	0	000		28.35			M	AA		29.90
03	2035	0	CLR	10.00		66	19.0	45	7.3	16	-9.0	14	5	040		28.35			M	AA		29.90
03	2055	0	CLR	10.00		68	20.0	47	8.2	19	-7.0	15	5	050		28.35			M	AA		29.90
03	2115	0	CLR	10.00		66	19.0	46	7.7	19	-7.0	16	3	060		28.35			M	AA		29.90
03	2135	0	CLR	10.00		66	19.0	46	7.7	19	-7.0	16	0	000		28.35			M	AA		29.90
03	2155	0	CLR	10.00		63	17.0	44	6.8	18	-8.0	17	0	000		28.35			M	AA		29.90
03	2215	0	CLR	10.00		66	19.0	46	8.0	21	-6.0	18	0	000		28.34			M	AA		29.89
03	2235	0	CLR	10.00		63	17.0	44	6.9	19	-7.0	18	0	000		28.34			M	AA		29.89
03	2255	0	CLR	10.00		63	17.0	44	6.9	19	-7.0	18	0	000		28.33			M	AA		29.88
03	2315	0	CLR	10.00		63	17.0	44	6.9	19	-7.0	18	0	000		28.33			M	AA		29.88
03	2335	0	CLR	10.00		61	16.0	44	6.3	19	-7.0	20	0	000		28.33			M	AA		29.88
03	2355	0	CLR	10.00		61	16.0	44	6.3	19	-7.0	20	0	000		28.33			M	AA		29.88

Figure A-10. Quality-controlled local climatological data hourly observations table for Casa Grande Municipal Airport, Casa Grande, AZ (11/03/2011). Dynamically generated via http://cdo.ncdc.noaa.gov/qclcd/QCLCD.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final)
HOURLY OBSERVATIONS TABLE
CASA GRANDE MUNICIPAL ARPT (03914)
CASA GRANDE, AZ (11/04/2011)

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801

Elevation: 1462 ft. above sea level
Latitude: 32.95
Longitude: -111.766
Data Version: VER2

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	Dry Bulb Temp		Wet Bulb Temp		Dew Point Temp		Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti-meter (in. hg)
						(F)	(C)	(F)	(C)	(F)	(C)											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
04	0015	0	CLR	10.00		61	16.0	44	6.6	21	-6.0	21	5	090		28.32			M	AA		29.87
04	0035	0	CLR	10.00		57	14.0	42	5.5	21	-6.0	25	6	060		28.31			M	AA		29.86
04	0055	0	CLR	10.00		57	14.0	42	5.2	19	-7.0	23	3	060		28.32			M	AA		29.87
04	0115	0	CLR	10.00		57	14.0	42	5.2	19	-7.0	23	6	070		28.31			M	AA		29.86
04	0135	0	CLR	10.00		59	15.0	43	5.8	19	-7.0	21	5	080		28.30			M	AA		29.85
04	0155	0	CLR	10.00		61	16.0	44	6.6	21	-6.0	21	6	100		28.30			M	AA		29.85
04	0215	0	CLR	10.00		61	16.0	44	6.6	21	-6.0	21	6	100		28.30			M	AA		29.85
04	0235	0	CLR	10.00		61	16.0	44	6.6	21	-6.0	21	5	130		28.30			M	AA		29.85
04	0255	0	CLR	10.00		59	15.0	43	6.1	21	-6.0	23	5	140		28.30			M	AA		29.85
04	0315	0	CLR	10.00		59	15.0	43	6.1	21	-6.0	23	3	130		28.29			M	AA		29.84
04	0335	0	CLR	10.00		59	15.0	43	6.1	21	-6.0	23	6	110		28.29			M	AA		29.84
04	0355	0	CLR	10.00		59	15.0	43	6.1	21	-6.0	23	7	110		28.28			M	AA		29.83
04	0415	0	CLR	10.00		61	16.0	44	6.6	21	-6.0	21	5	140		28.29			M	AA		29.84
04	0435	0	CLR	10.00		61	16.0	44	6.6	21	-6.0	21	7	110		28.29			M	AA		29.84
04	0455	0	CLR	10.00		61	16.0	45	6.9	23	-5.0	23	8	110		28.28			M	AA		29.83
04	0515	0	CLR	10.00		61	16.0	45	6.9	23	-5.0	23	11	110		28.28			M	AA		29.83
04	0535	0	CLR	10.00		61	16.0	45	6.9	23	-5.0	23	9	120		28.28			M	AA		29.83
04	0555	0	CLR	10.00		61	16.0	45	6.9	23	-5.0	23	9	110		28.28			M	AA		29.83
04	0615	0	CLR	10.00		61	16.0	45	6.9	23	-5.0	23	8	100		28.28			M	AA		29.83
04	0635	0	CLR	10.00		61	16.0	44	6.6	21	-6.0	21	7	100		28.28			M	AA		29.83
04	0655	0	CLR	10.00		61	16.0	44	6.6	21	-6.0	21	7	090		28.28			M	AA		29.83
04	0715	0	CLR	10.00		61	16.0	44	6.6	21	-6.0	21	6	090		28.28			M	AA		29.83
04	0735	0	CLR	10.00		61	16.0	44	6.6	21	-6.0	21	6	080		28.28			M	AA		29.83
04	0755	0	CLR	10.00		63	17.0	46	7.8	25	-4.0	24	7	100		28.28			M	AA		29.83
04	0815	0	CLR	10.00		64	18.0	47	8.0	25	-4.0	23	6	100		28.28			M	AA		29.83
04	0835	0	CLR	10.00		64	18.0	47	8.0	25	-4.0	23	7	110		28.29			M	AA		29.84
04	0855	0	CLR	10.00		66	19.0	47	8.5	25	-4.0	21	8	110		28.28			M	AA		29.83
04	0915	0	CLR	10.00		66	19.0	47	8.5	25	-4.0	21	5	100		28.28			M	AA		29.83
04	0935	0	CLR	10.00		68	20.0	49	9.4	27	-3.0	21	3	080		28.28			M	AA		29.83
04	0955	0	CLR	10.00		70	21.0	50	9.8	27	-3.0	20	3	070		28.27			M	AA		29.82
04	1015	0	CLR	10.00		72	22.0	51	10.3	27	-3.0	19	5	010		28.27			M	AA		29.82
04	1035	0	CLR	10.00		72	22.0	51	10.5	28	-2.0	19	5	050		28.27			M	AA		29.81
04	1055	0	CLR	10.00		75	24.0	52	11.2	28	-2.0	18	5	150		28.25			M	AA		29.80
04	1115	0	CLR	10.00		75	24.0	53	11.9	32	0.0	21	8	180		28.25			M	AA		29.79

04	1135	0	CLR	10.00			75	24.0	53	11.5	30	-1.0	19	13	160	21	28.23			M	AA		29.77
04	1155	0	CLR	9.00			79	26.0	55	12.8	32	0.0	18	22	190	29	28.21			M	AA		29.75
04	1215	0	CLR	6.00			79	26.0	55	12.8	32	0.0	18	23	170	31	28.20			M	AA		29.74
04	1235	0	CLR	8.00			79	26.0	56	13.1	34	1.0	20	23	170	29	28.18			M	AA		29.72
04	1255	0	CLR	10.00			79	26.0	56	13.1	34	1.0	20	24	170	30	28.16			M	AA		29.70
04	1315	0	BKN021 BKN027	2.50			81	27.0	56	13.5	34	1.0	18	23	190	33	28.14			M	AA		29.68
04	1335	0	OVC019	1.50			79	26.0	56	13.1	34	1.0	20	30	190	36	28.13			M	AA		29.67
04	1355	0	FEW019 SCT023 SCT028	3.00			81	27.0	57	13.9	36	2.0	20	20	190	29	28.12			M	AA		29.66
04	1415	0	BKN016 OVC025	1.25			81	27.0	56	13.5	34	1.0	18	29	200	38	28.11			M	AA		29.65
04	1435	0	BKN016 OVC021	2.00			81	27.0	57	13.9	36	2.0	20	30	200	37	28.10			M	AA		29.64
04	1455	0	OVC016	1.50			81	27.0	57	13.9	36	2.0	20	25	210	32	28.11			M	AA		29.65
04	1515	0	OVC018	2.00			81	27.0	57	13.9	36	2.0	20	22	200	31	28.10			M	AA		29.64
04	1535	0	FEW020 SCT027	3.00			81	27.0	57	14.1	37	3.0	21	25	210	32	28.09			M	AA		29.63
04	1555	0	CLR	5.00			79	26.0	57	13.6	37	3.0	22	21	200	26	28.09			M	AA		29.63
04	1615	0	CLR	5.00			79	26.0	57	14.0	39	4.0	24	20	210	29	28.09			M	AA		29.63
04	1635	0	CLR	4.00			77	25.0	59	14.9	45	7.0	32	22	200	28	28.09			M	AA		29.63
04	1655	0	CLR	3.00			75	24.0	60	15.2	48	9.0	39	22	210	31	28.09			M	AA		29.63
04	1715	0	CLR	4.00			73	23.0	59	14.8	48	9.0	41	22	210	28	28.10			M	AA		29.64
04	1735	0	SCT021	2.50			72	22.0	58	14.6	48	9.0	43	21	200	25	28.11			M	AA		29.65
04	1755	0	FEW021	4.00			72	22.0	58	14.6	48	9.0	43	23	210		28.11			M	AA		29.65
04	1815	0	CLR	5.00			70	21.0	58	14.2	48	9.0	46	17	210		28.12			M	AA		29.66
04	1835	0	CLR	5.00			70	21.0	58	14.2	48	9.0	46	16	210	24	28.12			M	AA		29.66
04	1855	0	CLR	10.00			70	21.0	59	14.7	50	10.0	49	14	210	24	28.12			M	AA		29.66
04	1915	0	CLR	10.00			68	20.0	57	13.7	48	9.0	49	16	210		28.12			M	AA		29.66
04	1935	0	FEW050	10.00			68	20.0	58	14.3	50	10.0	53	17	210	28	28.12			M	AA		29.66
04	1955	0	BKN042 BKN050	10.00			68	20.0	58	14.3	50	10.0	53	17	210		28.13			M	AA		29.67
04	2015	0	SCT042 OVC050	10.00			66	19.0	57	13.8	50	10.0	57	17	200		28.13			M	AA		29.67
04	2035	0	FEW041 BKN050 OVC060	8.00			66	19.0	57	13.8	50	10.0	57	20	200	26	28.13			M	AA		29.67
04	2055	0	BKN043 OVC050	10.00			66	19.0	56	13.3	48	9.0	52	22	210	29	28.13			M	AA		29.67
04	2115	0	FEW041 BKN050 OVC090	10.00			66	19.0	56	13.3	48	9.0	52	18	200	28	28.12			M	AA		29.66
04	2135	0	FEW047 SCT055 BKN095	5.00			66	19.0	55	12.8	46	8.0	49	21	210	26	28.13			M	AA		29.67
04	2155	0	FEW042 BKN095	5.00			64	18.0	55	12.8	48	9.0	56	23	200	33	28.12			M	AA		29.66
04	2215	0	BKN095	9.00			64	18.0	55	12.8	48	9.0	56	21	200	26	28.11			M	AA		29.65
04	2235	0	FEW095	10.00			63	17.0	55	12.6	48	9.0	58	24	200	30	28.11			M	AA		29.65
04	2255	0	SCT095	9.00			63	17.0	54	12.1	46	8.0	54	20	200	28	28.10			M	AA		29.64
04	2315	0	BKN095	8.00			63	17.0	54	12.1	46	8.0	54	28	180	33	28.09			M	AA		29.63
04	2335	0	SCT019 SCT041 BKN095	4.00			63	17.0	54	12.1	46	8.0	54	28	190	41	28.09			M	AA		29.63
04	2355	0	FEW018 BKN025 BKN038	5.00			61	16.0	54	12.1	48	9.0	63	24	180	30	28.09			M	AA		29.63

Figure A-11. Quality-controlled local climatological data hourly observations table for Casa Grande Municipal Airport, Casa Grande, AZ (11/04/2011). Strong south-southwesterly winds and reduced visibilities were reported much of the day. Dynamically generated via http://cdo.ncdc.noaa.gov/qclcd/QCLCD.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final)
HOURLY OBSERVATIONS TABLE
CASA GRANDE MUNICIPAL ARPT (03914)
CASA GRANDE, AZ (11/05/2011)

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801

Elevation: 1462 ft. above sea level
Latitude: 32.95
Longitude: -111.766
Data Version: VER2

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	Dry Bulb Temp		Wet Bulb Temp		Dew Point Temp		Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti-meter (in. hg)
						(F)	(C)	(F)	(C)	(F)	(C)											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
05	0015	0	FEW017 SCT025 BKN033	3.00		M	M	M	M	M	M	M	18	240	51	28.13			M	AA	0.14	29.67
05	0035	0	SCT017 BKN035 OVC048	9.00		M	M	M	M	M	M	M	26	250	34	28.16			M	AA	0.14	29.70
05	0055	0	FEW015 SCT024 OVC055	9.00		M	M	M	M	M	M	M	31	260	40	28.19			M	AA	0.14	29.73
05	0115	0	FEW036 BKN055 OVC070	10.00		46	8.0	44	6.4	41	5.0	83	24	250	38	28.23			M	AA	0.01	29.77
05	0135	0	SCT047 OVC055	10.00		46	8.0	43	5.9	39	4.0	77	17	240	28	28.22			M	AA	0.01	29.76
05	0155	0	FEW047 OVC055	10.00		46	8.0	44	6.4	41	5.0	83	15	190	21	28.24			M	AA	0.01	29.78
05	0215	0	SCT055 BKN080 OVC090	10.00		46	8.0	44	6.4	41	5.0	83	13	200	18	28.23			M	AA		29.77
05	0235	0	SCT070 OVC090	10.00		46	8.0	44	6.4	41	5.0	83	8	200		28.25			M	AA		29.80
05	0255	0	FEW070 SCT080 OVC100	10.00		46	8.0	44	6.4	41	5.0	83	7	180		28.27			M	AA		29.81
05	0315	0	OVC110	10.00		46	8.0	44	6.4	41	5.0	83	11	200		28.27			M	AA		29.81
05	0335	0	OVC120	10.00		46	8.0	44	6.4	41	5.0	83	13	200		28.27			M	AA		29.81
05	0355	0	FEW046 BKN120	10.00		48	9.0	44	6.5	39	4.0	71	16	220		28.27			M	AA		29.82
05	0415	0	BKN042 BKN120	10.00		48	9.0	44	6.5	39	4.0	71	11	230		28.27			M	AA		29.82
05	0435	0	FEW042	10.00		46	8.0	44	6.4	41	5.0	83	11	220		28.29			M	AA		29.84
05	0455	0	CLR	10.00		48	9.0	43	6.0	37	3.0	66	20	240	24	28.29			M	AA		29.84
05	0515	0	CLR	10.00		48	9.0	43	6.0	37	3.0	66	16	240		28.30			M	AA		29.85
05	0535	0	CLR	10.00		48	9.0	44	6.5	39	4.0	71	0	000		28.33			M	AA		29.88
05	0555	0	FEW044	10.00		48	9.0	43	6.0	37	3.0	66	5	240		28.33			M	AA		29.88
05	0615	0	CLR	10.00		46	8.0	43	5.9	39	4.0	77	9	230		28.33			M	AA		29.88
05	0635	0	FEW046	10.00		46	8.0	43	5.9	39	4.0	77	6	160		28.34			M	AA		29.89
05	0655	0	BKN046	10.00		46	8.0	43	5.9	39	4.0	77	3	010		28.36			M	AA		29.91
05	0715	0	BKN048	10.00		48	9.0	44	6.5	39	4.0	71	7	230		28.37			M	AA		29.92
05	0735	0	FEW048	10.00		48	9.0	44	6.5	39	4.0	71	6	200		28.38			M	AA		29.93
05	0755	0	CLR	10.00		46	8.0	43	5.9	39	4.0	77	0	000		28.40			M	AA		29.95
05	0815	0	FEW046	10.00		48	9.0	44	6.5	39	4.0	71	0	000		28.42			M	AA		29.97
05	0835	0	BKN044 BKN050	10.00		50	10.0	45	7.0	39	4.0	66	9	180		28.42			M	AA		29.97
05	0855	0	OVC042	10.00		52	11.0	46	7.6	39	4.0	61	9	200		28.43			M	AA		29.98
05	0915	0	OVC042	10.00		52	11.0	46	7.6	39	4.0	61	8	200		28.44			M	AA		29.99
05	0935	0	BKN042	10.00		54	12.0	47	8.1	39	4.0	57	10	220		28.45			M	AA		30.00
05	0955	0	FEW034 SCT044	10.00		54	12.0	47	8.1	39	4.0	57	7	240		28.46			M	AA		30.01
05	1015	0	SCT034 BKN046	10.00		54	12.0	47	8.1	39	4.0	57	13	220	16	28.47			M	AA		30.02
05	1035	0	SCT036 SCT046	10.00		54	12.0	47	8.1	39	4.0	57	5	260		28.47			M	AA		30.02
05	1055	0	SCT036	10.00		55	13.0	46	7.9	37	3.0	51	5	200		28.48			M	AA		30.03
05	1115	0	FEW036 SCT049	10.00		54	12.0	46	7.7	37	3.0	53	3	240		28.47			M	AA		30.02

05	1135	0	SCT040 BKN047	10.00			55	13.0	47	8.4	39	4.0	55	6	180		28.47			M	AA		30.02
05	1155	0	BKN040 OVC048	10.00			55	13.0	47	8.4	39	4.0	55	6	290		28.47			M	AA		30.02
05	1215	0	BKN043 OVC050	10.00			55	13.0	47	8.4	39	4.0	55	3	310		28.46			M	AA		30.01
05	1235	0	BKN043 OVC050	10.00			55	13.0	46	7.9	37	3.0	51	6	320		28.46			M	AA		30.01
05	1255	0	FEW043 BKN050	10.00			55	13.0	46	7.9	37	3.0	51	0	000		28.45			M	AA		30.00
05	1315	0	BKN050	10.00			57	14.0	47	8.5	37	3.0	47	0	000		28.44			M	AA		29.99
05	1335	0	BKN050	10.00			57	14.0	47	8.5	37	3.0	47	0	000		28.43			M	AA		29.98
05	1355	0	CLR	10.00			57	14.0	47	8.5	37	3.0	47	0	000		28.42			M	AA		29.97
05	1415	0	FEW046	10.00			57	14.0	47	8.5	37	3.0	47	0	000		28.42			M	AA		29.97
05	1435	0	FEW060	10.00			57	14.0	47	8.5	37	3.0	47	0	000		28.42			M	AA		29.97
05	1455	0	FEW050	10.00			57	14.0	47	8.5	37	3.0	47	0	000		28.42			M	AA		29.97
05	1515	0	FEW050	10.00			57	14.0	47	8.5	37	3.0	47	0	000		28.42			M	AA		29.97
05	1535	0	FEW050	10.00			57	14.0	47	8.5	37	3.0	47	0	000		28.41			M	AA		29.96
05	1555	0	FEW050	10.00			57	14.0	47	8.3	36	2.0	46	5	090		28.41			M	AA		29.96
05	1615	0	FEW050	10.00			57	14.0	47	8.5	37	3.0	47	0	000		28.41			M	AA		29.96
05	1635	0	SCT060	10.00			57	14.0	47	8.5	37	3.0	47	3	110		28.41			M	AA		29.96
05	1655	0	SCT060	10.00			57	14.0	47	8.3	36	2.0	46	3	070		28.41			M	AA		29.96
05	1715	0	FEW060	10.00			57	14.0	47	8.3	36	2.0	46	5	060		28.41			M	AA		29.96
05	1735	0	SCT060	10.00			57	14.0	47	8.3	36	2.0	46	0	000		28.41			M	AA		29.96
05	1755	0	FEW060	10.00			55	13.0	48	8.9	41	5.0	59	0	000		28.42			M	AA		29.97
05	1815	0	CLR	10.00			55	13.0	47	8.4	39	4.0	55	6	350		28.42			M	AA		29.97
05	1835	0	CLR	10.00			55	13.0	47	8.4	39	4.0	55	7	350		28.43			M	AA		29.98
05	1855	0	CLR	10.00			54	12.0	48	8.6	41	5.0	62	5	350		28.43			M	AA		29.98
05	1915	0	CLR	10.00			54	12.0	47	8.1	39	4.0	57	5	010		28.43			M	AA		29.98
05	1935	0	CLR	10.00			54	12.0	47	8.1	39	4.0	57	5	360		28.43			M	AA		29.98
05	1955	0	CLR	10.00			52	11.0	47	8.1	41	5.0	66	6	360		28.43			M	AA		29.98
05	2015	0	CLR	10.00			52	11.0	47	8.1	41	5.0	66	5	340		28.44			M	AA		29.99
05	2035	0	CLR	10.00			50	10.0	46	7.5	41	5.0	71	6	360		28.44			M	AA		29.99
05	2055	0	CLR	10.00			50	10.0	46	7.5	41	5.0	71	7	350		28.44			M	AA		29.99
05	2115	0	CLR	10.00			50	10.0	45	7.0	39	4.0	66	6	350		28.45			M	AA		30.00
05	2135	0	CLR	10.00			48	9.0	44	6.5	39	4.0	71	5	350		28.45			M	AA		30.00
05	2155	0	CLR	10.00			48	9.0	44	6.5	39	4.0	71	5	350		28.45			M	AA		30.00
05	2215	0	CLR	10.00			48	9.0	44	6.5	39	4.0	71	0	000		28.45			M	AA		30.00
05	2235	0	CLR	10.00			46	8.0	43	5.9	39	4.0	77	3	010		28.45			M	AA		30.00
05	2255	0	CLR	10.00			46	8.0	43	5.9	39	4.0	77	6	010		28.44			M	AA		29.99
05	2315	0	CLR	10.00			46	8.0	43	5.9	39	4.0	77	5	020		28.44			M	AA		29.99
05	2335	0	CLR	10.00			46	8.0	43	5.9	39	4.0	77	3	080		28.44			M	AA		29.99
05	2355	0	CLR	10.00			48	9.0	44	6.5	39	4.0	71	0	000		28.44			M	AA		29.99

Figure A-12. Quality-controlled local climatological data hourly observations table for Casa Grande Municipal Airport, Casa Grande, AZ (11/05/2011). Winds shifted to west-southwesterly and rain was reported at Casa Grande after midnight following cold frontal passage. Dynamically generated via http://cdo.ncdc.noaa.gov/qclcd/QCLCD.

Appendix B:
ADEQ and NWS Forecasts and Advisories

MARICOPA COUNTY DUST CONTROL FORECAST

ISSUED THURSDAY, NOVEMBER 3, 2011

Three-day weather outlook:

A very strong trough of low pressure will bring unseasonably cool air and significant winds. Blowing dust is expected across a much of the desert southwest as gust will likely top 50 mph. There's a 70% chance of evening showers in Phoenix continuing into early Saturday. Winds drop of considerably Saturday afternoon. Daytime temperatures will be in the upper 60s through the weekend with lows in the 40s. The risk of exceeding the 24-hr PM10 health standard in Phoenix will be **HIGH** on Friday, dropping to Low by Saturday.

R I S K F A C T O R S

	WINDS		STAGNATION		UNHEALTHY PM-10 RISK LEVEL
Day 1: Fri 11/04/2011	Northwest winds around 25 to 35 mph are expected with gusts near 50 mph at times (70% chance of showers late).	+	Little to not stagnation is expected.	=	**HIGH**
Day 2: Sat 11/05/2011	Southwest winds around 5 to 10 mph are expected (10% chance for morning showers).	+	Increasingly stagnant conditions will develop during the afternoon.	=	**LOW**
Day 3: Sun 11/06/2011	South-southwest winds around 5 to 10 mph are expected.	+	Rather stagnant conditions are likely much of the day.	=	**LOW**
EXTENDED OUTLOOK					
Day 4: Mon 11/07/2011	West winds around 5 to 10 mph are expected.	+	Rather stagnant conditions are likely much of the day.	=	**LOW**
Day 5: Tue 11/08/2011	Mostly light winds are expected.	+	Rather stagnant conditions are likely much of the day.	=	**LOW**

ADEQ Arizona Department of Environmental Quality

VERY UNHEALTHY (201-300)

UNHEALTHY (151-200)

UNHEALTHY FOR SENSITIVE GROUPS (101-150)

MODERATE (51-100)

GOOD (0-50)

For more information visit:
http://www.airnow.gov/index.cfm?action=aqibasics.aqi

LINK TO 2011 AIR POLLUTION EXCEEDANCE GRAPH

AIR QUALITY FORECAST FOR FRIDAY, NOVEMBER 4, 2011

This report is updated by 1:00 p.m. Sunday thru Friday and is valid
for areas within and bordering Maricopa County in Arizona

FORECAST DATE NOTICES (*SEE BELOW FOR DETAILS) AIR POLLUTANT	YESTERDAY WED 11/02/2011 DUST Highest AQI Reading/Site (Preliminary data only)	TODAY THU 11/03/2011	TOMORROW FRI 11/04/2011 (PM10) DUST COUNTY-ISSUED NO BURN DAY	EXTENDED SAT 11/05/2011
O3*	42 MULTIPLE LOCATIONS	38 GOOD	35 GOOD	38 GOOD
CO*	8 TEMPE	23 GOOD	9 GOOD	17 GOOD
PM-10*	282 ZUNI HILLS	40 GOOD	195 UNHEALTHY	35 GOOD
PM-2.5*	36 DURANGO & DYSART	60 MODERATE	45 GOOD	53 MODERATE

* O3 = Ozone CO = Carbon Monoxide PM-10 = Particles 10 microns & smaller PM-2.5 = Particles smaller than 2.5 microns

*"Ozone Health Watch" means that the highest concentration of OZONE may approach the federal health standard.
"PM-10 or PM-2.5 Health Watch" means that the highest concentration of PM-10 or PM-2.5 may approach the federal health standard.
"High Pollution Advisory" means that the highest concentration of OZONE, PM-10, or PM-2.5 may exceed the federal health standard.
"DUST" means that short periods of high PM-10 concentrations caused by outflow from thunderstorms are possible.

…A PM10 HIGH POLLUTION ADVISORY HAS BEEN ISSUED FOR FRIDAY, NOV. 4, 2011…

Wednesday's cold front brought strong winds to the region with gusts reaching 50 mph at times in the northwest part of the Valley. It was there that the highest levels of PM10 were recorded (282 AQI at Zuni Hills, 76 AQI at Dysart). As winds decreased to a steady 10-20 mph, the air cleared out well across the forecast area. Thursday's winds are considerably lower and will remain that way through early Friday.

With Wednesday's event in the books, we're looking ahead at Friday's system. This trough of low pressure will drop a bit further south, generating much stronger winds across the southwest. Widespread dust is likely from southern California east across Arizona deserts including the cities of Yuma, Phoenix, Casa Grande and Tucson. The timing of the strongest winds in Phoenix will be between 11am and 11pm. Fortunately because the system is dropping further south, it will tap into a good fetch of moisture. We will see showers develop across the region around 3-5pm with the heaviest expected around 11pm. Totals will generally be around a tenth to a half an inch with more near thunderstorms and in the upslope areas. The rain should help wash out any lingering/suspended dust.

Colder air will fill in behind the system, dropping daytime temperatures into upper 60s Saturday and Sunday with lows in the 40s.

NOTE: Multiple-vehicle accidents are not uncommon along Arizona freeways when similar wind/dust events occur. This is especially a concern for drivers along I-10 between California and Phoenix and between Phoenix and Tucson, as well as I-8 between Casa Grande and Yuma. Those expecting to travel along these routes may want to pay close attention to the Nation Weather Service and Arizona Department of Transportation for the latest weather information and road conditions.

National Weather Service Tucson Forecast Products

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE TUCSON AZ
910 PM MST THU NOV 3 2011

.SYNOPSIS...A STRONG PACIFIC STORM SYSTEM WILL BRING WINDY CONDITIONS WITH AREAS OF BLOWING DUST FRIDAY...FOLLOWED BY VALLEY RAIN AND MOUNTAIN SNOW FRIDAY NIGHT AND SATURDAY. DRY CONDITIONS WILL OCCUR SUNDAY...THEN ANOTHER STORM SYSTEM WILL BRING A CHANCE OF SHOWERS MONDAY. MUCH COOLER THIS WEEKEND WITH BELOW NORMAL DAYTIME TEMPERATURES DURING THE UPCOMING WEEK.

&&

.DISCUSSION...ADJUSTED THE GRIDDED DATA SKY FIELDS TO ACCOUNT FOR MORE CLOUDS TONIGHT VERSUS THE INHERITED FORECAST. ALSO...DECREASED POPS FROM TUCSON WWD SAT AFTERNOON VERSUS THE INHERITED FORECAST. OTHERWISE...PLEASE REFER TO THE PREVIOUS DISCUSSION SECTION BELOW FOR ADDITIONAL DETAIL.

&&

.PREV DISCUSSION...GOES SOUNDER PRECIPITABLE WATER VALUES ARE STEADILY INCREASING ALONG THE SOUTHERN COAST OF CALIFORNIA AND INTO SOUTHWEST ARIZONA. BEFORE THE MOISTURE ARRIVES THOUGH...THE PRESSURE GRADIENT RAPIDLY INTENSIFIES AS A DEEP UPPER TROUGH WITH A SLIGHT POSITIVE TILT DIGS INTO SOUTHERN CALIFORNIA FRIDAY AFTERNOON. LL JET RAMPS UP WITH 700MB WIND SPEEDS IN EXCESS OF 50 KTS BY 00Z SATURDAY. THIS SHOULD TRANSLATE TO A SOLID WIND ADVISORY DAY ACROSS ALL OF SOUTHEAST ARIZONA. A FEW LOCATIONS MAY EVEN TOUGH HIGH WIND WARNING LEVELS LATE IN THE DAY. DUST WILL BE AN ISSUE TOMORROW SO KEPT MENTION OF BLOWING DUST IN THE GRIDS...AND EVEN SPREAD THE BLOWING DUST INTO THE 00Z TO 06Z SATURDAY TIME FRAME EVEN THOUGH SHOWERS MAY GET STARTED IN THAT TIME FRAME. FORECAST SOUNDINGS KEEP THE WINDS BLOWING THROUGH THE EVENING AND OVERNIGHT HOURS WHICH SEEMS REASONABLE GIVEN THE DYNAMIC UPPER TROUGH.

WIND ADVISORY
URGENT - WEATHER MESSAGE
NATIONAL WEATHER SERVICE TUCSON AZ
908 PM MST THU NOV 3 2011

AZZ501>515-041400-
/O.CON.KTWC.WI.Y.0017.111104T1800Z-111105T1200Z/
WESTERN PIMA COUNTY-TOHONO O'ODHAM NATION-
UPPER SANTA CRUZ RIVER VALLEY/ALTAR VALLEY-TUCSON METRO AREA-
SOUTH CENTRAL PINAL COUNTY-SOUTHEAST PINAL COUNTY-
UPPER SAN PEDRO RIVER VALLEY-
EASTERN COCHISE COUNTY BELOW 5000 FEET-UPPER GILA RIVER VALLEY-
WHITE MOUNTAINS OF GRAHAM AND GREENLEE COUNTIES-
GALIURO AND PINALENO MOUNTAINS-CHIRICAHUA MOUNTAINS-
DRAGOON AND MULE AND HUACHUCA AND SANTA RITA MOUNTAINS-
CATALINA AND RINCON MOUNTAINS-BABOQUIVARI MOUNTAINS-
INCLUDING THE CITIES OF...AJO...ORGAN PIPE CACTUS N.M....SELLS...
NOGALES...TUCSON...GREEN VALLEY...MARANA...VAIL...

PICACHO PEAK STATE PARK...MAMMOTH...ORACLE...SIERRA VISTA...
BENSON...WILLCOX...DOUGLAS...CLIFTON...SAFFORD...
HANNAGAN MEADOW...MOUNT GRAHAM...CHIRICAHUA NM...BISBEE...
CANELO HILLS...MADERA CANYON...MOUNT LEMMON...SUMMERHAVEN
908 PM MST THU NOV 3 2011

...WIND ADVISORY REMAINS IN EFFECT FROM 11 AM FRIDAY TO 5 AM MST SATURDAY...

A WIND ADVISORY REMAINS IN EFFECT FROM 11 AM FRIDAY TO 5 AM MST SATURDAY.

* TIMING...WINDS WILL INCREASE BY MID MORNING FRIDAY...THEN STRONG AND GUSTY WINDS WILL CONTINUE THROUGH FRIDAY AFTERNOON.

* WINDS...SOUTH TO SOUTHWEST WINDS OF 25 TO 35 MPH WITH GUSTS UP TO 50 MPH.

* IMPACTS...THESE WINDS WILL RESULT IN AREAS OF BLOWING DUST WHICH CAN RAPIDLY REDUCE VISIBILITIES...WITH LOCALIZED VISIBILITIES BELOW A HALF MILE IN DUST PRONE AREAS.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

A WIND ADVISORY MEANS THAT SUSTAINED WINDS OF 30 MPH OR GREATER ARE EXPECTED IN THE VALLEYS...OR 35 MPH OR GREATER ABOVE 5000 FEET. HIGHER GUSTS ARE ALSO LIKELY. THIS COULD MAKE DRIVING DIFFICULT...ESPECIALLY FOR HIGH PROFILE VEHICLES. USE EXTRA CAUTION.

HAZARDOUS WEATHER OUTLOOK
NATIONAL WEATHER SERVICE TUCSON AZ
333 AM MST FRI NOV 4 2011

AZZ501>515-051045-
WESTERN PIMA COUNTY-TOHONO O'ODHAM NATION-
UPPER SANTA CRUZ RIVER VALLEY/ALTAR VALLEY-TUCSON METRO AREA-
SOUTH CENTRAL PINAL COUNTY-SOUTHEAST PINAL COUNTY-
UPPER SAN PEDRO RIVER VALLEY-
EASTERN COCHISE COUNTY BELOW 5000 FEET-UPPER GILA RIVER VALLEY-
WHITE MOUNTAINS OF GRAHAM AND GREENLEE COUNTIES-
GALIURO AND PINALENO MOUNTAINS-CHIRICAHUA MOUNTAINS-
DRAGOON AND MULE AND HUACHUCA AND SANTA RITA MOUNTAINS-
CATALINA AND RINCON MOUNTAINS-BABOQUIVARI MOUNTAINS-
333 AM MST FRI NOV 4 2011

...WIND ADVISORY REMAINS IN EFFECT FROM 11 AM THIS MORNING TO 5 AM MST SATURDAY...

THIS HAZARDOUS WEATHER OUTLOOK IS FOR PORTIONS OF SOUTHEAST ARIZONA.

.DAY ONE...TODAY AND TONIGHT

A FAST APPROACHING PACIFIC STORM SYSTEM WILL MOVE INTO ARIZONA TODAY...AND TRACK THROUGH ALL OF SOUTHEAST ARIZONA THROUGH MID-DAY SATURDAY.

SUSTAINED SOUTH TO SOUTHWEST WINDS OF 25 TO 35 MPH WITH GUSTS TO
50 MPH ARE POSSIBLE THIS AFTERNOON INTO TONIGHT. THEREFORE...A
WIND ADVISORY IS IN EFFECT FOR ALL OF SOUTHEAST ARIZONA FROM 11 AM
TODAY TO 5 AM MST SATURDAY MORNING. PLEASE REFER TO AWIPS HEADER
/PHXNPWTWC/ OR WMO HEADER /WWUS75 KTWC/ FOR ADDITIONAL INFORMATION.

THESE WINDS WILL LIKELY RESULT IN AREAS OF BLOWING DUST WITH REDUCED
VISIBILITIES AT TIMES. IN ADDITION...THESE WINDS COUPLED WITH DRY
CONDITIONS WILL APPROACH CRITICAL FIRE WEATHER THRESHOLDS.

EXPECT VALLEY RAIN AND MOUNTAIN SNOW TO SPREAD ACROSS THE AREA
THIS EVENING THROUGH SATURDAY MORNING WITH SEVERAL INCHES OF SNOW
POSSIBLE OVER THE HIGHER TERRAIN...ESPECIALLY THE WHITE MOUNTAINS.

.DAYS TWO THROUGH SEVEN...SATURDAY THROUGH THURSDAY

MUCH COLDER AIR WILL THEN SETTLE IN THIS WEEKEND AND INTO EARLY NEXT
WEEK WITH TEMPERATURES IN EASTERN VALLEYS APPROACHING THE FREEZING
MARK ON A NUMBER OF MORNINGS.

SHORT TERM FORECAST
NATIONAL WEATHER SERVICE TUCSON AZ
1151 AM MST FRI NOV 4 2011

AZZ501>515-042100-
WESTERN PIMA COUNTY-TOHONO O'ODHAM NATION-
UPPER SANTA CRUZ RIVER VALLEY/ALTAR VALLEY-TUCSON METRO AREA-
SOUTH CENTRAL PINAL COUNTY-SOUTHEAST PINAL COUNTY-
UPPER SAN PEDRO RIVER VALLEY-
EASTERN COCHISE COUNTY BELOW 5000 FEET-UPPER GILA RIVER VALLEY-
WHITE MOUNTAINS OF GRAHAM AND GREENLEE COUNTIES-
GALIURO AND PINALENO MOUNTAINS-CHIRICAHUA MOUNTAINS-
DRAGOON AND MULE AND HUACHUCA AND SANTA RITA MOUNTAINS-
CATALINA AND RINCON MOUNTAINS-BABOQUIVARI MOUNTAINS-
INCLUDING...AJO...ORGAN PIPE CACTUS N.M....SELLS...NOGALES...
TUCSON...GREEN VALLEY...MARANA...VAIL...PICACHO PEAK STATE PARK...
MAMMOTH...ORACLE...SIERRA VISTA...BENSON...WILLCOX...DOUGLAS...
CLIFTON...SAFFORD...HANNAGAN MEADOW...MOUNT GRAHAM...
CHIRICAHUA NM...BISBEE...CANELO HILLS...MADERA CANYON...
MOUNT LEMMON...SUMMERHAVEN...KITT PEAK
1151 AM MST FRI NOV 4 2011

.NOW...

A HIGH WIND ADVISORY IS IN EFFECT FROM 11AM THIS MORNING UNTIL 5AM
MST SATURDAY. WINDY CONDITIONS WITH GUSTS OF 25 TO 38 MPH HAVE BEEN
OBSERVED NEAR SIERRA VISTA...NOGALES...BISBEE...SELLS...
TUCSON...SAFFORD...AND DOUGLAS. THESE WINDS MAY PRODUCE AREAS OF
BLOWING DUST THAT MAY LIMIT VISIBILITIES BELOW ONE
MILE...ADDITIONALLY GUSTY WINDS MAY CAUSE DIFFICULTIES WHEN
OPERATING HIGH PROFILE VEHICLES ON STATE HIGHWAYS AND INTERSTATES.

SHORT TERM FORECAST
NATIONAL WEATHER SERVICE TUCSON AZ
702 PM MST FRI NOV 4 2011

AZZ501>515-050415-
WESTERN PIMA COUNTY-TOHONO O'ODHAM NATION-
UPPER SANTA CRUZ RIVER VALLEY/ALTAR VALLEY-TUCSON METRO AREA-
SOUTH CENTRAL PINAL COUNTY-SOUTHEAST PINAL COUNTY-
UPPER SAN PEDRO RIVER VALLEY-
EASTERN COCHISE COUNTY BELOW 5000 FEET-UPPER GILA RIVER VALLEY-
WHITE MOUNTAINS OF GRAHAM AND GREENLEE COUNTIES-
GALIURO AND PINALENO MOUNTAINS-CHIRICAHUA MOUNTAINS-
DRAGOON AND MULE AND HUACHUCA AND SANTA RITA MOUNTAINS-
CATALINA AND RINCON MOUNTAINS-BABOQUIVARI MOUNTAINS-
INCLUDING...AJO...ORGAN PIPE CACTUS N.M....SELLS...NOGALES...
TUCSON...GREEN VALLEY...MARANA...VAIL...PICACHO PEAK STATE PARK...
MAMMOTH...ORACLE...SIERRA VISTA...BENSON...WILLCOX...DOUGLAS...
CLIFTON...SAFFORD...HANNAGAN MEADOW...MOUNT GRAHAM...
CHIRICAHUA NM...BISBEE...CANELO HILLS...MADERA CANYON...
MOUNT LEMMON...SUMMERHAVEN...KITT PEAK
702 PM MST FRI NOV 4 2011

.NOW...
...A WIND ADVISORY IS IN EFFECT UNTIL 5 AM SATURDAY...
...A HIGH WIND WARNING IS IN EFFECT FROM 10 PM THIS EVENING TO 5 AM SATURDAY...

SUSTAINED WIND SPEEDS ACROSS MUCH OF THE REGION DURING THE EARLY EVENING WILL BE AROUND 23 MPH. WIND GUSTS IN THE SHELTERED AREAS WILL BE FROM 30 TO 36 MPH....WITH OPEN AREAS REACHING NEAR 45 MPH AT TIMES. AFTER 8 PM...EXPECT WIND SPEEDS TO INCREASE. SUSTAINED SOUTHWEST TO WEST WIND AROUND MUCH OF THE REGION WILL BE FROM 25 TO 30 MPH...WITH POSSIBLE GUSTS AROUND 50 MPH...AND SOME WIDE OPEN AREAS COULD GET BRIEF GUSTS TO NEAR 60 MPH.

PUBLIC INFORMATION STATEMENT
NATIONAL WEATHER SERVICE TUCSON AZ
919 PM MST FRI NOV 4 2011

...HIGHEST WINDS OBSERVED IN THE PAST 24 HOURS...

...ARIZONA...

...SANTA CRUZ COUNTY...

12 W SIERRA VISTA (4629 FT)(RAWS)	808 PM NOV 4	46 MPH
6 NE NOGALES (3956 FT)(ASOS)	854 PM NOV 4	45 MPH
3 SSW PATAGONIA (4170 FT)(APRSWXNET)	615 PM NOV 4	40 MPH
12 NW PATAGONIA (7120 FT)(RAWS)	819 PM NOV 4	34 MPH

...PINAL COUNTY...

14 E DUDLEYVILLE (4040 FT)(RAWS)	802 PM NOV 4	31 MPH
ORACLE (4360 FT)(APRSWXNET)	1200 PM NOV 4	20 MPH
2 ESE ORACLE (4632 FT)(APRSWXNET)	533 PM NOV 4	15 MPH

...PIMA COUNTY...

18 NNE PATAGONIA (4650 FT)(RAWS)	853 PM NOV 4	47 MPH
28 SSW THREE POINTS (3500 FT)(RAWS)	833 PM NOV 4	40 MPH
1 WSW SELLS (2262 FT)(RAWS)	314 PM NOV 4	39 MPH

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8 W TUCSON (2591 FT)(APRSWXNET)                  831 PM NOV 4     37 MPH
8 NE THREE POINTS (2418 FT)(OTHER-MTR)           555 PM NOV 4     36 MPH
4 W ORO VALLEY (2751 FT)(APRSWXNET)              849 PM NOV 4     35 MPH
2 SSE TUCSON (2703 FT)(OTHER-MTR)                855 PM NOV 4     34 MPH
9 E TUCSON (3041 FT)(APRSWXNET)                  903 PM NOV 4     33 MPH
6 SW TUCSON (2641 FT)(ASOS)                      653 PM NOV 4     33 MPH
9 W TUCSON (2641 FT)(APRSWXNET)                  834 PM NOV 4     32 MPH
8 E TUCSON (2887 FT)(APRSWXNET)                  901 PM NOV 4     30 MPH
16 SE TUCSON (3300 FT)(APRSWXNET)                858 PM NOV 4     30 MPH
12 WSW TUCSON (2511 FT)(AWS)                     405 PM NOV 4     27 MPH
9 SE TUCSON (2582 FT)(APRSWXNET)                 859 PM NOV 4     27 MPH
7 SSE ORO VALLEY (2920 FT)(APRSWXNET)            649 PM NOV 4     27 MPH
10 N GREEN VALLEY (2765 FT)(APRSWXNET)           905 PM NOV 4     27 MPH
22 SSW THREE POINTS (3202 FT)(AWS)              1210 PM NOV 4     26 MPH
12 ESE CATALINA (7554 FT)(RAWS)                  837 PM NOV 4     26 MPH
12 ENE TUCSON (2762 FT)(APRSWXNET)               313 PM NOV 4     26 MPH
9 NNE TUCSON (2264 FT)(RAWS)                     608 PM NOV 4     24 MPH
5 S ORO VALLEY (2821 FT)(APRSWXNET)              424 PM NOV 4     24 MPH
5 NW TUCSON (2405 FT)(AWS)                       459 PM NOV 4     23 MPH
9 NE TUCSON (2650 FT)(APRSWXNET)                 400 PM NOV 4     23 MPH
9 ENE TUCSON (2690 FT)(APRSWXNET)                414 PM NOV 4     23 MPH
5 SE MARANA (2132 FT)(APRSWXNET)                1248 PM NOV 4     23 MPH
20 E TUCSON (8209 FT)(RAWS)                      737 PM NOV 4     23 MPH
8 NW TUCSON (2291 FT)(AWS)                       900 PM NOV 4     21 MPH
6 SW ORO VALLEY (2449 FT)(AWS)                   845 PM NOV 4     21 MPH
10 NE TUCSON (2727 FT)(APRSWXNET)                517 PM NOV 4     21 MPH
9 NNE TUCSON (2264 FT)(APRSWXNET)                530 PM NOV 4     20 MPH
3 WNW TUCSON (2474 FT)(AWS)                      300 PM NOV 4     18 MPH
4 ESE TUCSON (2756 FT)(APRSWXNET)                303 PM NOV 4     15 MPH
15 ESE TUCSON (3300 FT)(APRSWXNET)               816 PM NOV 4     15 MPH
8 N TUCSON (2931 FT)(AWS)                        225 PM NOV 4     13 MPH
6 N TUCSON (2601 FT)(APRSWXNET)                  645 PM NOV 4     13 MPH
5 E TUCSON (2668 FT)(APRSWXNET)                  402 PM NOV 4     13 MPH
6 ENE TUCSON (2588 FT)(APRSWXNET)                435 PM NOV 4     12 MPH
8 NNE TUCSON (2840 FT)(APRSWXNET)                903 PM NOV 4     12 MPH
4 S ORO VALLEY (2595 FT)(APRSWXNET)              859 PM NOV 4     12 MPH
3 S MARANA (2093 FT)(APRSWXNET)                  501 PM NOV 4     12 MPH
4 SW ORO VALLEY (2513 FT)(APRSWXNET)             148 PM NOV 4     10 MPH

...GREENLEE COUNTY...

10 S CLIFTON (6340 FT)(RAWS)                     503 PM NOV 4     40 MPH
15 N MORENCI (6250 FT)(RAWS)                     835 PM NOV 4     21 MPH
21 S THREE FORKS (7945 FT)(RAWS)                 819 PM NOV 4     20 MPH

...GRAHAM COUNTY...

13 SW THATCHER (9521 FT)(RAWS)                   802 PM NOV 4     32 MPH
4 ENE SAFFORD (3176 FT)(ASOS)                   1051 AM NOV 4     28 MPH
23 NE BYLAS (7428 FT)(RAWS)                      627 PM NOV 4     27 MPH
12 S THATCHER (4925 FT)(RAWS)                    837 PM NOV 4     26 MPH
10 ESE BYLAS (3300 FT)(RAWS)                     253 PM NOV 4     26 MPH

...COCHISE COUNTY...

6 SE SIERRA VISTA (4645 FT)(APRSWXNET)           745 PM NOV 4     68 MPH
7 SE SIERRA VISTA (4683 FT)(APRSWXNET)           800 PM NOV 4     61 MPH
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2 SSW HUACHUCA CITY (4718 FT)(OTHER-MTR)	755 PM NOV 4	51 MPH
5 WSW HUACHUCA CITY (4701 FT)(OTHER-MTR)	856 PM NOV 4	47 MPH
22 WNW RODEO (5400 FT)(RAWS)	437 PM NOV 4	43 MPH
21 E WILLCOX (3770 FT)(MESOWEST)	747 PM NOV 4	41 MPH
3 N BISBEE (5377 FT)(APRSWXNET)	404 PM NOV 4	40 MPH
9 NNW DOUGLAS (4150 FT)(ASOS)	856 PM NOV 4	37 MPH
9 SE SIERRA VISTA (4611 FT)(APRSWXNET)	852 PM NOV 4	36 MPH
12 ESE SIERRA VISTA (4243 FT)(APRSWXNET)	903 PM NOV 4	33 MPH
9 SSE SIERRA VISTA (5400 FT)(RAWS)	1019 AM NOV 4	32 MPH
20 E TOMBSTONE (4155 FT)(APRSWXNET)	300 PM NOV 4	31 MPH
19 WSW RODEO (5700 FT)(RAWS)	1257 PM NOV 4	31 MPH
3 NW RODEO (4147 FT)(APRSWXNET)	1033 AM NOV 4	30 MPH
26 ESE SAN MANUEL (4560 FT)(RAWS)	203 PM NOV 4	28 MPH
11 E TOMBSTONE (5026 FT)(APRSWXNET)	212 PM NOV 4	28 MPH
18 NNW PIRTLEVILLE (4198 FT)(AWS)	205 PM NOV 4	27 MPH
3 SE SIERRA VISTA (4642 FT)(APRSWXNET)	808 PM NOV 4	25 MPH
27 ENE TOMBSTONE (4387 FT)(AWS)	520 PM NOV 4	23 MPH
BENSON (3650 FT)(APRSWXNET)	141 PM NOV 4	22 MPH
17 NE TOMBSTONE (4670 FT)(APRSWXNET)	903 PM NOV 4	20 MPH
11 W BISBEE (4203 FT)(AWS)	329 PM NOV 4	20 MPH
8 SSE SIERRA VISTA (4780 FT)(APRSWXNET)	758 PM NOV 4	19 MPH
23 N BENSON (3212 FT)(APRSWXNET)	904 PM NOV 4	18 MPH

OBSERVATIONS ARE COLLECTED FROM A VARIETY OF SOURCES WITH VARYING EQUIPMENT AND EXPOSURES. NOT ALL DATA LISTED IS CONSIDERED OFFICIAL. THE NATIONAL WEATHER SERVICE THANKS ITS PRIVATE AND PUBLIC PARTNERS FOR PROVIDING US WITH THIS DATA.

Appendix C:
Affidavit of Public Notice